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Original Contributions.

PORCELAIN INLAYS IN COMBINATION WITH CAST-FILLINGS AND HOOD ABUTMENTS.

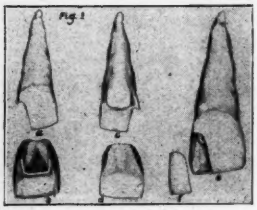
BY C. L. ALEXANDER, D.D.S., CHARLOTTE, N. C. READ BEFORE THE NATIONAL DENTAL ASSOCIATION, AT ASHEVILLE, N. C., JULY 28-31, 1903.

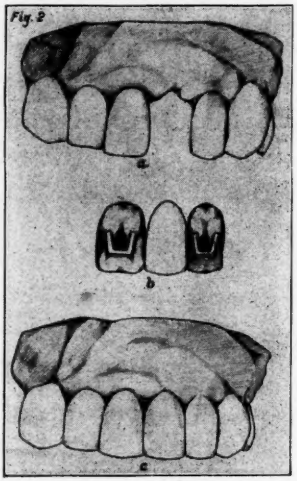
The present demand of all classes upon the dental profession, and one which cannot be ignored, is for a method of restoring lost or broken-down teeth without a display of gold. This demand is imperative, it appeals strongly to our professional pride, and we should rise up boldly and erase from the dental escutcheon the stigma that has been placed upon it by the indiscriminate and vulgar use of gold within the mouth.

An article by Dr. S. G. Perry (DENTAL DIGEST, October, 1903, p. 1220) is no doubt fresh in the minds of all who have been privileged to read it. His conception of the real and ideal so beautifully expressed will hold its place among the gems adorning dental literature. It cannot be read without stimulating the desire to reach the goal which ever moves onward and upward. The doctor's article is filled with love for the beautiful, and it is also tempered with good judgment, which does not take him beyond the point of allowing latitude in which to execute ideas which are practical and in harmony with the real and ideal.

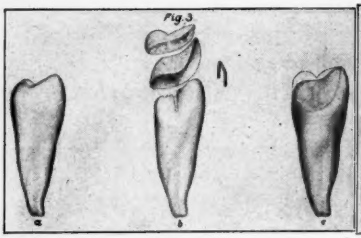
Appreciating the imperfection of the dental art as practiced, I have from time to time given expression to ideas which have presented themselves as being valuable in overcoming some of the failings and which have appealed to me from an esthetic standpoint. One of these I wish to call your attention to especially, namely, porcelain as used in combination with cast restoration for individual teeth and hood abutments for bridgework. My desire has always been for the profession to use these devices without encumbrance, so I have never

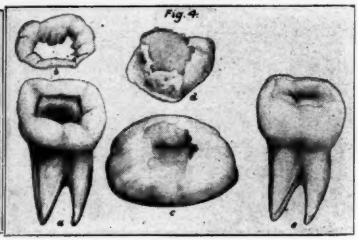
applied for a patent on them. July 28, 1896, I read a paper before the Southern Dental Association on cast-fillings and hood abutments, dealing largely with the technique of this class of work. The method as practiced by me up to that time can be understood by referring





to the proceedings of that meeting, or to the October, 1896, number of the *Cosmos*. The principles involved there are substantially the same as those I shall now emphasize, but I shall give them wider scope. I have found that gold .003 of an inch in thickness is more





suitable for making the base of these fillings and hoods, therefore I do not now use the platinum as I did then, nor do I confine myself to the use of pins and posts for their attachment. Later I will call your attention to various other methods that have been in use by

me for some years for giving strength and stability to these hoods and fillings. At that time a doubt existed as to the success of the work, owing to the uncertainty of the durability of the cement used in their retention. Time has removed this doubt, and it remains only to perfect the highest conception of the ideal in this class of work.

Here let me make a digression from the regular trend of thought, in order to point out the difference between a gold inlay and a gold cast-filling. A gold inlay would suggest to the mind the insertion and retention by the aid of some suitable substance, such as cement, of a form of gold in a cavity within the tooth. Cast-fillings, on the other hand, are made in an entirely different way, and cover a field

Fig. 5

of restoration which cannot be classed as an inlay. The lost parts are restored in wax, from which duplicate casts of gold are made and cemented upon the tooth. The terms inlay and cast-filling do not correctly convey the ideas contained in them, and, while they are in a measure misnomers, I trust they may serve to sufficiently carry the information I am trying to impart, and that some better nomenclature may soon be had for describing these methods.

From the standpoint of utility the cast-work has been a success. By its use we can restore and save teeth which would be consigned to some system of crowning or in many cases extracted. The only annoying objection to it is the unavoidable display of gold. To overcome this feature I have resorted to the use of porcelain in combination with the cast-work, the technique of which I will now endeavor to make plain. We will take for the purpose of demonstration a right

central incisor with the corner broken off. First, the cavities are excavated, and the tooth is restored to its original contour with cement. It is then provided with a gold hood which is burnished to the surface of the tooth, covering the entire lingual surface and cutting edge, the margins are allowed to extend just under the free edge of the gum and to the front laterally, sufficient to prevent the line of margin from being a point of contact with the adjacent teeth when the finished hood is adjusted to its final position (Fig. 1).

Where we have a devitalized tooth the hood is retained in position with a post extending well down into the root. In delicate cases, where possibly the enamel wall is all that is left standing anteriorly, this post receives all the strain to which the tooth is subjected. When

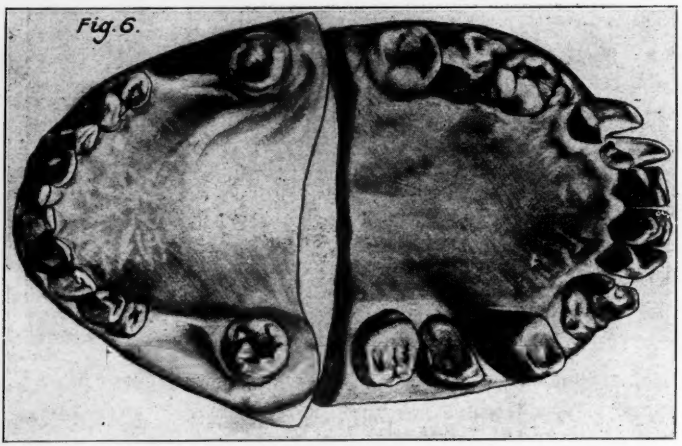


Fig. 6.

operating upon a live tooth the hood is provided with a staple as shown in the drawing, a groove having been cut in the tooth to engage the staple. In some cases the staple is not practical and pins are suggested instead, a series of from two to four being used. Sometimes conditions are so favorable for the retention of this work that it is necessary only to make a groove and burnish the gold into it. Often we can omit even this precaution and be certain of successful retention of these hoods. A button or slug of some high-fusing metal tacked to the base of these fillings makes a splendid anchorage.

After the base of the hood is finished an impression is taken, from which models are made showing the work in relief. The gold base

is built up with wax as conditions may indicate, then the work is cut away from the model and the wax restoration is covered with No. 30 rolled gold foil, the lingual surface is left uncovered to permit the gold solder (22 K.) when fused to fill the matrix, which is seen after the piece has been invested and the wax melted out. The hood thus secured is finished and cemented to position on the tooth. The cement used in restoring the contour is now removed and a porcelain inlay made and permanently cemented to its position. An investigation of this method will reveal its merits, for work of this character has strength and beauty and gives satisfaction to the most fastidious.

The following illustrations and descriptions will give the reader a clearer conception of the possibilities of this work than has been set forth in this paper.

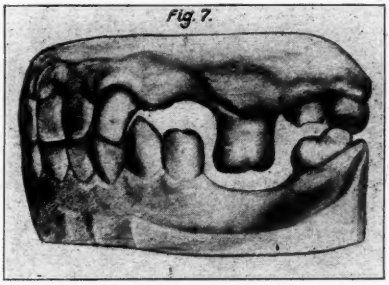


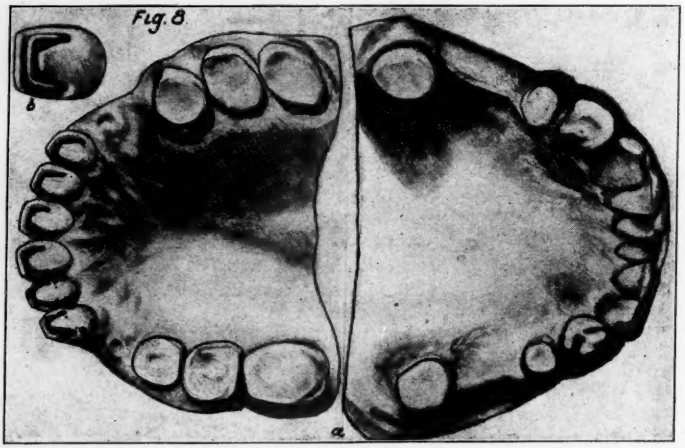
Fig. 1a shows a right central with mesio-incisal corner to be restored; b, gold hood with staple attachment; c, lingual surface of tooth, showing undercut into which the staple fits; d, lingual surface of gold hood; e, tooth shown labially, with gold hood and staple in position; f, porcelain corner or inlay.

In Fig. 2 is shown a method of swinging in one or more teeth with the aid of the staple hood, thus avoiding a display of gold. In cases where the abutments are badly broken down the porcelain idea as described with Fig. 1 may be used to advantage—a, case as presented; b, tooth ready for insertion, showing staple hoods by which attachments are made to the incisors on either side; c, finished case.

Fig. 3 shows a bicuspid with hood abutment in course of preparation; it illustrates a beautiful and substantial way of making an abutment for a bridge or restoring a tooth which has lost its lingual cusp. A, perfect bicuspid tooth; b, broken down tooth showing staple,

hood and gold cusp used in restoration; c, tooth with hood abutment and cusp in position.

Fig. 4 portrays a very simple and practical way of making a cast-filling or inlay. The gold is burnished down within the cavity, after which a piece of wax is placed in position and the patient instructed to close the mouth. This done the work is removed from the mouth and the wax is trimmed from the edges and the occluding portion covered with No. 30 rolled gold foil. The form of the filling thus secured is inverted and invested and the wax is boiled out through the opening which has been left in top of investment. Gold solder is now placed in the matrix and fused until a solid inlay is formed. The cast-filling or inlay thus made is cemented into position and given the final finish on the occlusal surface—a, molar with occlusal



cavity; b, gold matrix; c, matrix invested; d, cast-filling or inlay; e, tooth with cast filling in position and thus restored.

In Fig. 5 we have two practical cases, one of which shows the two bicuspids broken down (a) and restoration made by means of cast-hood abutments (b). There is also shown (c) a case with left lateral of which only the enamel wall is standing. In such cases the cast-hood attachment will be found an ideal method of restoration.

Figs. 6 and 7 represent two views of a case as first received for treatment.

Fig. 8 shows the teeth prepared for staple crown and bridgework.

Fig. 9 represents the case completed and full restoration made. A careful study of the different phases of this case will reveal the many difficulties which had to be overcome.

Fig. 10a illustrates another case where the four incisor teeth are broken down and in course of preparation for staple hood restoration; b shows the same case completed.

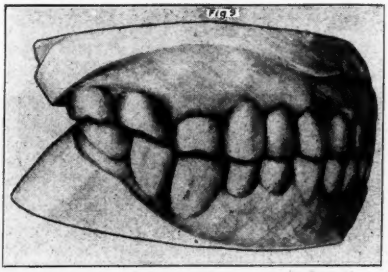


Fig. 11a shows case with bicuspids and molars broken down as presented for treatment; b, same case prepared for cast-hood abutments; c, the case showing work completed.

Discussion. *Dr. R. B. Adair,* Atlanta: Nothing has given me so much satisfaction as this hood abutment, and it is one of the most valuable adjuncts we have to crown and bridgework. All that I

Fig. 10

have made are standing up well and giving entire satisfaction. They are especially indicated in anterior teeth with live pulps where you don't want gold to show. In such cases they are a splendid substitute for the old-fashioned open-face crown.

Dr. W. V-B. Ames, Chicago: Some dentists have been annoyed by threats made by Dr. Carmichael of Milwaukee, who claims a pat-

ent upon all methods similar to this hood operation of Dr. Alexander. While I admire the results obtained by Dr. Carmichael, I take no stock whatever in the validity of his patent, as I am thoroughly convinced that similar operations performed by Dr. Alexander and myself antedate that patent and would alone be sufficient to set it aside. Anyone who has not seen Dr. Alexander's work should examine his beautiful specimens. I have nothing but commendation for his method.

Dr. H. H. Johnson, Macon, Ga.: The benefit I have received from

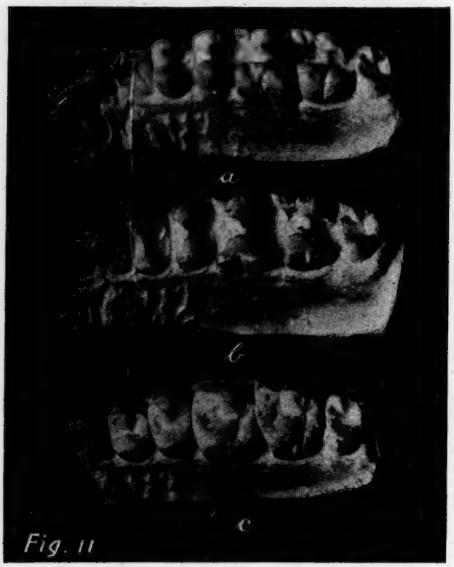


Fig. 11

Dr. Alexander's teaching cannot be calculated in dollars and cents. Neither the paper, models nor diagrams do justice to this work—it must be seen in the mouth to be properly appreciated.

Dr. Robin Adair, Atlanta: I have been using these Alexander hood abutments for four years and have never seen one break or wear through or cause any inflammation at the cervical margin. I have swung six and even eight teeth upon them and the work has lasted for years with no evidence of curling up at the thin margins. One of the best cases for this work is in a woman's mouth when the upper

incisors have been lost by pyorrhea. By simply cutting a groove on the inner side of the remaining teeth and putting on a hood abutment the pulps are preserved and there will be no inflammation or decay at the cervical border.

ADHESION VS. ATMOSPHERIC PRESSURE IN THE RETENTION OF DENTAL PLATES.

BY N. C. LEONARD, D.D.S., NASHVILLE, TENN. READ BEFORE THE NATIONAL DENTAL ASSOCIATION, AT ASHEVILLE, N. C., JULY 28-31, 1903.

In an essay entitled "Some Physical Principles Applied in Dentistry," read a little more than a year ago at a meeting of the Tennessee Dental Association, I took the position that adhesion and not atmospheric pressure was responsible for the retention of dental plates, giving some of my reasons for such belief. This statement provoked such a general furore of adverse criticism in the discussion which followed, leaving me the only advocate of my side of the case, and resulting in not a single convert from the opposing side, that I considered the matter of sufficient importance to justify me in bringing it before this body for discussion.

That an error has been and is being taught as to the relative part played by different forces involved in the retention of an upper plate I am convinced, and I am confident that a careful and scientific study of the principles involved will convince even the most skeptical, and will eliminate an error that has already occupied too conspicuous a place in the literature and teaching of one of the learned professions. The question is purely one of physics, and the principles involved are facts not theories, hence our conclusions may be accurate and definite, not mere supposition or personal opinions.

Since this error is evidently the result of a misconception of the physical laws involved, or a misunderstanding of their application to the conditions present with an upper plate in place, perhaps it may be well to define some of these laws in order to get them clearly before us in making their application. Atmospheric pressure is simply the weight of the atmosphere which, owing to its peculiar physical properties, manifests itself in every direction with the same force. At sea level this pressure is about fifteen pounds to the square inch of surface, and as it is the same upon every surface of an object the

weight of the object is not affected by it excepting to the extent of the actual weight of the volume of air displaced; that is, the force being equal in all directions makes a perfect balance of pressure, which being constant is not perceptible. An unbalance may be created, however, upon lessening the pressure on one side of a body by removing a portion of the atmosphere and thus creating a partial vacuum. This unbalance is in direct proportion to the volume of air removed from a given space.

The textbook definition of adhesion is, "that form of molecular attraction which exists between unlike particles of matter brought in contact with each other." It may be stated at the outset that atmospheric pressure and adhesion are two separate and distinct forces, neither of which is in anywise dependent upon the other for the full manifestation of its power.

One of the simplest illustrations of the force of adhesion may be made with two plain glass plates. By moistening the surfaces and placing them in contact we find that it takes considerable force to pull them apart, in fact, well-fitting plates brought in close contact with a film of water between may be made to sustain a weight of from six ounces to several pounds to the square inch, the amount depending upon the degree of adaptation of the two surfaces. This is a case of simple adhesion in which atmospheric pressure does not even play a part, and I wish to say in submitting this definite proposition that there is no other in physics the solution of which is more obvious than this or more consistent with recognized physical laws. While it is true that in this experiment the atmosphere is excluded from between the glass plates, the hydrostatic pressure of the film of water between, with the air pressing on the exposed edges, has exactly the same force, and the pressure is equalized.

A prevailing idea among dentists seems to be that when the surface of a plate is well adapted in every part to the mucous surface in the mouth, pressure of the atmosphere is exhibited only on the lingual and labial surfaces, and this is the force that prevents the plate from falling. The idea is absurd and wholly inconsistent with physical principles, and until it is entirely eliminated from the mind there can be no proper understanding of the true forces concerned and the part which each plays in the retention of the plate. The hydrostatic pressure of the fluid between the plate and the mucous membrane—the fluid being acted upon by the atmosphere—exerts exactly the

same amount of force on that surface of the plate that the air exerts *directly* on the opposite side. This makes a perfect balance which can have no weight-sustaining power.

By actual experiment I have demonstrated that glass plates placed together, as just suggested, with a film of water between will sustain just as much weight in a vacuum as in the atmosphere. In this way I have held suspended six and one-half ounces to one square inch of surface in a vacuum reduced to one-eightieth of one atmosphere. According to the laws of atmospheric pressure of fifteen pounds to the square inch, one-eightieth of one atmosphere by the most perfect arrangement possible could support only three ounces, while in this experiment six and one-half ounces were supported.

Were we not familiar with the laws of atmospheric and hydrostatic pressure, these experiments alone would indicate that atmospheric pressure could not be considered a factor in sustaining the weight, since the same amount will be sustained inside a vacuum or in the open atmosphere. So far as I can see there is no foundation whatever for a rational argument on the other side of the case, and it must be admitted that in the physical arrangement just suggested atmospheric pressure may be entirely eliminated as one of the weight-sustaining forces.

In the adjustment of a simple upper plate without the so-called air chamber the physical arrangement is practically the same as in the experiment with the glass plates, with two exceptions—first, we have two irregular surfaces adapted together with a fluid between them, instead of two plain surfaces; second, that one of the surfaces is soft and elastic. The first is an advantage, since it increases the amount of surface exposed to the action of adhesion and prevents largely the tendency of the two surfaces to slide upon each other; the second precludes the possibility of securing the full force of adhesion in admitting of the force being overcome gradually by beginning at the edges. When traction is made on the plate, tending to dislodge it, the surface of the mucous membrane, by virtue of its elasticity and the adhesive force with which it clings to the plate, is slightly lifted, adhesion is overcome first at the edges of the plate, and the mucous membrane is peeled off, as it were, the air and excess of fluid following up the separation.

While the entire surface of the mucous membrane covered by the plate has more or less elasticity, we know that usually there are

certain areas which are less yielding than others to pressure, either on account of the extreme density of the underlying integument, or the close proximity of the bone to the surface. In the surface ordinarily covered by a full upper plate the hard area is that part forming the vault of the arch and corresponds to the hard palate.

Where a plate which comes in contact with the entire mucous surface is adjusted in a case of this kind we find that when pressure is made on the grinding surface of the molars or bicuspids on one side, as in masticating, the yielding tissues of that side are compressed more readily than those in the center of the arch, and we find this hard area covering the palate acting as a fulcrum, and the opposite side of the palate may be pried loose, the elastic tissues on that side slightly lifting and the adhesive force being overcome again first at the edges.

As stated before, atmospheric pressure can have no weight-sustaining power greater than its specific gravity unless there be a partial vacuum, and in order to produce a partial vacuum by lifting the plate from the surface adhesion must first be overcome in order to secure space; then there must be some way of preventing the ingress of air. Since adhesion *must* yield first at the edge of the plate, the separation must be instantly followed by the air, which has no resistance to overcome.

Granting for the sake of argument that we have a mouth in which the mucous tissues are tightly bound down to a hard and unyielding surface *only in the center* of the vault, while the membranes covering the rest of the surface possess the usual amount of elasticity, let a well-fitting plate be adjusted in this case and pressed well into place in order to secure good contact, then if traction is made on it at right angles to the surface we find again that the soft parts, by virtue of their elasticity and adhesion, are slightly lifted, and in this case adhesion must be first overcome in the center where the tissues are unyielding. The moment that adhesion is overcome at that point there will be created a partial vacuum to which the atmosphere on the opposite side of the plate and directly over the space will manifest pressure in proportion to the exhaustion of the cavity created. Since the separation of the two surfaces at this point could amount to only the fractional part of a line without breaking up the adhesion to a point where the external atmosphere would be freely admitted, and knowing that the mucous membrane has the power of absorbing

a considerable amount of air which may be easily extracted from it, we can easily see that the degree of exhaustion obtained would not secure enough force from without to make an appreciable difference in preventing the dislodgment of the plate. In reality, however, these specific conditions would seldom occur, since the hard palatal portion of the arch usually extends backward to the palatal edge of the plate, and consequently atmosphere would be freely admitted from the outside the moment the two surfaces were separated.

Again, upon pressing the distal edge of the plate firmly against the tissues, and making sufficient downward traction at the incisal region to overcome adhesion and lift the plate away from the surface, a considerable unbalance may be created in the atmospheric force that would aid very materially in preventing the complete dislodgment of the plate. Since, however, there is no tendency to dislodge the plate in its proper use by force exerted in this way, this point is valuable only in "fooling" the patient into believing that the plate is held in place more securely than it really is. Even this seeming phenomenal resistance to displacement is not in a majority of cases due largely to atmospheric pressure, since traction produced at this point and in this direction must first overcome the greatest resistance of adhesion.

The remaining point to be considered is the relation borne by the so-called "air chamber" and "relief spaces" to the question under discussion. If a cavity of definite shape be made in the palatine surface of a well-fitting upper plate we have, when the plate is adjusted to the mouth, a definite area of the surface which does not come in contact with the mucous membrane—that is to say, there is adjacent to the mucous membrane a space or recess in the plate containing air. This cavity can be partially exhausted of its air if suction be made with the tongue at the palatal edge of the plate. This causes the soft tissues directly above the cavity to be forced down into it and against its edges, partially filling the cavity and preventing for a time the ingress of air from the outside. Thus a partial vacuum is maintained for a while and the services of atmospheric pressure are secured, but only over the definite area of the vacuum chamber, the amount of force manifested being in proportion to the degree of exhaustion and the area of the space. Over the rest of the surface of the plate a perfect atmospheric balance is maintained just the same as before suction was made.

The length of time which this partial vacuum may be maintained, granting that the plate is well conformed to the mouth, is dependent upon several conditions—first, the degree of exhaustion and the consequent force with which the mucous membrane is held against the edges of the air chamber, thus modifying the facility with which air or fluid may enter from without; second, the sharpness of the angle at the palatal edges of the chamber, a sharp edge making entrance of fluids, etc., more difficult; third, the resistance and porosity of the soft tissues in the region of the air chamber; fourth, the amount and quality of mucus discharged from the glands in and around the area covered by the plate, and fifth, the amount of force tending to dislodge the plate. These five variable conditions modify to a greater or less degree the facility with which the unbalanced atmospheric force reestablishes its equilibrium.

We know that the mucous membrane has the power of absorbing air, which it will readily give up, and that air may even be extracted by suction from the circulation. From these sources and by the gradual flow of mucus and saliva the vacuum is soon reduced and equilibrium is again established. This is illustrated by producing suction on the barrel of a key or a small bottle, and leaving it attached to the lips or tongue; it will hang until the vacuum has been reduced by air extracted from the tissues and then drop off from its weight. This illustration will also indicate the degree of stasis produced in the tissues under pressure by leaving a blue place the size and shape of the opening in the instrument used, and will suggest the degree of inflammation that would soon be induced by the constant irritation from even a slight vacuum.

"Relief spaces" act in the same way as the air chamber, save that it is more difficult to maintain a vacuum in the relief spaces for reasons already suggested.

I have shown that the services of atmospheric pressure in supporting a weight can be secured only by producing a vacuum, that a vacuum can be maintained in the physical arrangement under consideration only by having a cavity of definite shape in the palatal surface of the plate, and that the unbalanced force is manifested only about the definite area of this cavity. Should this force alone be just sufficient to support the weight of the plate (and a less force would scarcely be worth consideration in point of utility) and could other forces be entirely eliminated so that the entire weight of an

ordinary plate might be suspended by about three-fourths of a square inch of the mucous membrane, it is safe to say that the amount of active inflammation that would be induced in the tissues in twenty-four hours would be unbearable.

I do not mean to say it is argued by any one that adhesion does not assist in supporting the plate; the illustration is used only to show that atmospheric pressure sufficient to be valuable even in assisting other forces in the retention of a plate, and manifested only on such a limited area, would be impracticable owing to the irritation it would produce. It must be admitted by any careful experimenter that in a well-adapted plate in a favorable case the force of adhesion alone, acting on the same area of space, would be sufficient to support the weight of an ordinary plate. By this I mean that in a favorable case in which we can eliminate entirely the question of air pressure, we will find that a well-adapted plate will sustain more than as many times its weight as an ordinary air chamber would be contained times in the whole area of surface in contact.

While I do not believe that the so-called "vacuum chamber" is valuable as a vacuum chamber in securing the services of air pressure, I believe that in some cases good results may be had from its use merely as a *relief space,* and sometimes by interfering to a degree with the lateral motion of the plate in cases where there is hypertrophy of the membranes into the chamber. However, I do not wish to precipitate a discussion upon the subject of air chambers excepting to the extent that my subject would suggest.

I have now, to the best of my ability and as thoroughly as my allowance of time will admit, covered the principal points of my subject, and will make a few general remarks. In the experiment with the two plain glass plates, a significant point lies in the fact that if an excess of water be added or allowed to remain around the edges after the plates have been firmly pressed together, we find that capillary attraction is so strongly manifested that the two surfaces are forced so far apart that the full force of adhesion is lost and but little weight will be sustained. This illustrates two valuable points in utilizing the force of adhesion in retaining dental plates in the mouth: first, that the closest contact of surfaces is necessary to secure the greatest adhesion; second, that capillarity, where there is an excess of fluid, will interfere with this close contact and even overcome the force of adhesion altogether by forcing the surface of

the plate away from the mucous membrane. This latter point is illustrated by the difficulty of retaining an upper plate in mouths where there is a profuse flow of saliva and mucus, and it is the removal of the excess of fluid from underneath the plate that is the reason for the frequent pressing up and sucking action of the tongue exhibited by nearly all patients who wear plates. An abnormal flow of mucus and saliva is frequently stimulated or induced by the presence of a new plate in a mouth not accustomed to wearing one, and for this reason a plate that seemed to fit perfectly at first may appear loose and unstable after a few hours' wear.

In order to secure the most perfect adaptation of surfaces in adjusting an upper plate to place, considerable force is necessary to secure contact at every point, and for this reason it is essential that the pressure be equally distributed. If there be hard places in the surface covered by the plate they will receive most of the force and in this way interfere with securing good contact with the more yielding tissues. For this reason the pressure should be "relieved" at these points and the "bearing" increased over the very soft areas. A few laboratory experiments will illustrate what slight inaccuracies of adjustment of two surfaces will lessen the degree of adhesion. The shrinkage of a modeling composition model for a plate without undercuts will lessen the adhesion of the two surfaces more than half of that manifested when the model is first made. This will suggest the inaccuracies that may occur in the construction of dentures from molecular changes that take place from the different processes in the materials used in their construction, and will account for many of the difficulties in securing a perfect fit which are attributed to other causes.

Discussion. *Dr. S. H. Guilford,* Philadelphia: It seems to me that some of Dr. Leonard's statements in regard to physical laws are correct, others involved, and others absolutely incorrect. He speaks about hydrostatic pressure and atmospheric pressure. We have to do with hydrostatics because liquids are involved, but not with hydrostatic pressure. The physical characteristics of air and water are very similar in many respects—one is a liquid and one is not, but both are fluids. A fluid is a substance the particles of which move easily among themselves in all directions. This is illustrated by a standpipe filled with water. The lateral pressure at any given point of its height is just the same as the pressure downward at that

point. This fact is taken advantage of in a reservoir, for instead of building the breast of the dam vertically, so that the water would exert an immense pressure laterally, it is sloped off, allowing the pressure to come upon the hypothenuse of a triangle instead of upon one of its sides.

I think the essayist has mistaken hydrostatic pressure for adhesion, but they are quite different. The two glass plates with a thin film of water between them remain in contact because of the adhesion of the water. The plates must be made as flat as possible and they will not hold together if more than a minute quantity of water is placed between them. Prof. Tait says that adhesion and cohesion are largely synonymous terms. The two plates of glass with the water between give an example of adhesion because there is a foreign substance between them, but if there is no water there they will still hold together, and that is cohesion. It is one of the properties of matter that when substances are brought close enough together they are held there by what is known as the attraction of cohesion, but if there is any considerable space between them that property is not manifested. This is the same in the open air as in the vacuum, and the fact that the plates were placed under an air-pump does not prove anything, because their adhesion does not depend upon atmospheric pressure. I think the essayist has chosen an unfortunate illustration. He says that the relation between the vulcanite plate and the mucous membrane is practically the same as that of the two plates of glass with the water between. He claims that in the case of the mouth we have two irregular surfaces with fluid between them instead of plane surfaces, and that this is an advantage because it increases the amount of surface exposed to the action. That is wrong. Under the laws of physics, if two planes are to be held in contact by cohesion or adhesion their surfaces must be as nearly smooth as possible. You cannot succeed with two plates of roughly ground glass, for with an irregular surface you have spaces that will contain a considerable amount of water, and that destroys the adhesion, for it will occur only at the points which are so close as to contain only a thin film. Again, one object is soft and elastic in the case of the mouth. A better illustration to bring out the point Dr. Leonard desired to make would be the familiar one of the disk of leather which is soaked in water and pressed down on the brick or cobblestone in the pavement when it is necessary to lift out the

latter. If the leather disk were used dry it would contain too much air and would not adapt itself so readily to the surface. In the center of the disc we have atmospheric pressure and around the rim adhesion.

Dr. Leonard says that when you have a vacuum chamber in the plate the exhaustion of air pertains only to the space occupied by the vacuum chamber, and he claims this is not enough to support the plate. Some plates are made with vacuum chambers and others without, and good results are obtained by both methods. In the one case we have a certain amount of adhesion—not perfect, because of the irregular surface, but which is sufficient in many mouths, and in the other case we have a partial vacuum. It seems to me that the matter resolves itself into the question, shall we depend upon adhesion entirely or upon the partial vacuum and adhesion combined? The essayist contends that vacuum chambers fill up and cease to be vacuums, but if we enlarge the chamber from time to time, as can readily be done in vulcanite plates, improvement will result, which proves that atmospheric pressure acts in the way I have suggested. Perforate the vacuum chamber with a pin, and you will find that while you have eliminated atmospheric pressure the adhesion amounts to at least five-sixths of the surface of the plate, yet I never knew of plates that could be retained under such conditions. I have seen plates which did not fit at all, did not touch more than half the surface, and had no vacuum chamber, but still they were worn. This was simply adaptability, as the patients had become accustomed to them. I have always believed in a vacuum chamber of considerable extent but shallow.

Dr. J. D. Patterson, Kansas City, Mo.: Instead of saying the law of hydrostatic pressure Dr. Leonard should have said the influence of hydrostatics, and then Dr. Guilford's criticism would have fallen to the ground. Dr. Guilford also makes an error in his distinction between the attraction of cohesion and adhesion. Cohesion is attraction between ultimate particles, while adhesion is cohesion en masse between like or unlike substances. I am thoroughly in agreement with Dr. Leonard's claims. Our interest in the matter is large, because if it is adhesion alone that retains the denture, as he has described, then our attention centers in the question of how to obtain the most perfect adhesion.

Dr. W. V-B. Ames, Chicago: I think Dr. Guilford went too far

in misunderstanding Dr. Leonard. The essayist gave us a good exposition of the physics of the case, but at the same time demonstrated that he had never taken advantage of atmospheric pressure in the retention of plates to the extent it can be utilized. He made it plain that in the usual adaptation of the denture to the surface of the parts there are points where there is little tissue—practically only the bone—and the adhesion is very slight because of these points.

The illustration of making a minute puncture in the plate is certainly proof positive that there must be something besides adhesion and capillary attraction in the satisfactory retention of a plate. It is one thing to make plates so that the patients will have to be told they must masticate in a certain way, and another thing to make a plate which fits so well that when they want to take it out to clean it they will be compelled to raise the lip to permit the entrance of air beneath it.

Dr. B. H. Teague, Aiken, S. C.: I believe that plates are held in place by atmospheric pressure to a great extent, and the reason they fail is because there is not proper adaptation and correct impingement on the gum. If you will examine the skeleton arch of the mouth you will find, about three-fourths of an inch from the alveolar border along the molars on either side, the posterior palatine fossæ, which are for blood vessels. When the impression is taken these fossæ are not properly impressed, and unless the model is properly trimmed or adjusted at these points there will be no pressure there. In trimming a model it should be held in the hand, the mouth examined at the same time, and the whole surface of the latter gone over with an instrument. Wherever there is hardness the model should be built up only so far as the opposing point in a plate might press the mouth, and wherever there is softness the model should be scraped, and more particularly so where these fossæ are found on either side of the mouth. When a plate is made in this way there will be perfect atmospheric adhesion.

Dr. Ames: I did not make it plain what I would do to accomplish the results described. I merely run the plate far enough back to reach the sort of tissue which we have in the lips and cheek—simply go far enough around the tuberosity so the entire periphery of the plate can displace tissue of sufficient elasticity to give the condition Dr. Leonard speaks of when you draw down on the front teeth and get the evidence of atmospheric pressure. By displacing the

soft tissue with the entire periphery you get the same effect that you do in drawing down the anterior teeth.

Dr. M. S. Merchant, Giddings, Tex.: In running the plate back so far how do you overcome the inclination to nausea?

Dr. Ames: In some mouths there is this tendency from any disturbance in the region of the palate, but in most cases the nausea is due to the fact that the plate is not held firmly, but is slipping around. As I describe it, however, it is rigidly held at all times. Sometimes patients have not been able to wear a plate in the office, but after experimenting a little at home they have conquered their feelings and have never had a return of the nausea.

Dr. E. A. Bogue, New York: Dr. Ames did not say so, but it is true that he takes particular pains with the articulation in these cases, being very careful that when the jaws are closed the lower teeth shall drive the upper teeth backward and so keep the strong adhesion constantly acting.

Dr. S. P. Sharp, Knoxville, Tenn.: Why do large plates fit so much better than small ones? I have just as good adhesion with the latter as with the former, but the large ones hold better.

Dr. Leonard, closing discussion: Dr. Guilford spoke of my position in saying that hydrostatic pressure was manifested in the case of the two pieces of glass placed together with water between. It is true. Take two plates of glass and place a drop of water on one of them. It is just sufficient to fill all the interstices and the space between the two. It is being compressed by the atmosphere at the rate of fifteen pounds to the square inch of surface, and is resisting at the same rate that the pressure is being exerted on the outside. That is, the water is showing the same amount of resistance to the atmosphere that the atmosphere is manifesting in tending to compress the molecules of the water. When the two plates are adjusted the atmospheric pressure is exhibited directly on the water only at the edges, being excluded at other points. This column of water reacting just as it did before is exerting pressure against the inner surface of the plates, tending to separate them. I think it is a clear exhibition of hydrostatic pressure.

I still maintain that two irregular surfaces offer more surface for the action of the force of adhesion than as if the plate were a plane. I did not say that rough surfaces would exhibit a greater force of adhesion, but that irregular surfaces would expose a greater area to

its action. Of course, the smoother the surface the better is the manifestation of adhesion, but smoothness does not always mean a plane surface, as it may be irregular.

As regards the air hole in the vacuum chamber, that illustration does not prove that atmospheric pressure is the force which holds the plate. We have all seen plates with holes in them worn comfortably. The air may come in and break up the adhesion, as the breath will drive air through the hole and against the mucous membrane, and the adhesion is lost by forcing the two surfaces apart.

Dr. Ames made the point that the plate could be drawn down and then be pulled back again. That phenomenon cannot be attributed to atmospheric pressure more than to adhesion, because we know that adhesion will admit of elasticity of the membrane being manifested, and when you draw it down you get the effect of the elasticity on the plate. We know that this elasticity of the membrane will be manifested in an effort to dislodge the plate. Dr. Ames also refers to the plate extending back onto the soft tissue beyond the hard area, and I mentioned that same point in my paper, in regard to the outer edges of the plate remaining adherent longer, providing you had an elastic membrane all around the periphery and the hard areas in the center. The adhesion would be last overcome along the elastic surface, but the separation of the two surfaces—the plate and the hard areas—would be so slight in advance of the other that the air absorbed by the mucous membrane would relieve the slight unbalance and you would not find the atmospheric force of any practical value. I think the point is conceded by those who make the plates, that the hard areas usually extend clear back to the edge of the plate and that the plate should be trimmed off about the edge of the hard palate.

Dr. Ames: Are you not willing to admit that I have secured the results which I have described?

Dr. Leonard: I do not doubt your results, but I am speaking of what generally obtains. I admit that you can get a degree of unbalance which will aid in the retention of the plate in that way, but it is usually of such minor importance that it cannot be considered as of practical value. As regards the vacuum created under the lip by trying to remove the plate, the lip immediately collapses, following up the edge of the plate, and no space is created. Ordinarily there is no space between the lip and gum, and when the plate is

moved down the tissues will fall into place and there will be no space in which there could be a vacuum.

In answer to Dr. Sharp's question, the more surface we have exposed to the force of adhesion the greater will be the manifestation of that force.

CAVITY PREPARATION AND INSTRUMENTATION.

BY W. E. HARPER, D.D.S., CHICAGO. READ BEFORE THE NEBRASKA STATE DENTAL SOCIETY, AT LINCOLN, MAY 19-21, 1903.

By close study of the structure of the enamel and the form and arrangement of the teeth, and a careful analysis of incipient decay, we will early recognize structural imperfections, such as pits and fissures, as one great predisposing cause of decay, and the form and arrangement of the teeth in the arch as a second predisposing cause, the latter operating by affording inaccessible surfaces or parts of same (as the proximal, gingival or cervical third of buccal, labial and lingual surfaces). This inaccessibility of parts of surfaces of teeth results in constant or habitual uncleanliness of the parts, which sooner or later terminates in decay, if the environment of the teeth is coincidently favorable.

To these causes of decay in unfilled teeth I would add the faulty methods of cavity preparation as a most common predisposing cause in filled teeth, as it has been my experience to note that fifty to seventy-five per cent of the fillings I have been called upon to make were refillings, a condition which I feel demands our earnest attention. All observing practitioners must have noticed that on certain parts of surfaces decay is practically never found, that all cavities are common to certain localities, around which we will always find areas of practical immunity to decay. If this be true, it would seem good policy in all instances to extend the outline of cavities to these immune areas of habitual cleanliness, particularly so if failure to do this results in decay around fillings in so large a per cent of our operations as before mentioned. It becomes an important duty to study these areas of habitual uncleanliness and to seek the immune areas, that we may protect our fillings by locating the margins within these boundaries by a little additional cutting of tooth substance in one or more directions when preparing the cavity. For this purpose we may divide all cavities into two groups, each having a different loca-

tion and cause of decay, and requiring a radical difference in their treatment in cutting to outline form.

Group 1 comprises cavities occurring as a result of structural imperfections (pits and fissures). All of these cavities occur on self-cleansing surfaces, occlusal surfaces of the bicuspids and molars, lingual surfaces of the incisors, occlusal third of buccal and lingual surfaces. These surfaces and parts of surfaces are constantly cleansed except in these imperfections, chiefly by the excursions of food and in part by the tongue, cheeks and tooth-brush. In all pit and fissure cavities the surfaces immediately surrounding the imperfections are immune to decay, being self-cleansing; and all that is required in cutting the cavity outline is that you completely remove all enamel undermined by decay, and cut out any imperfections or angular grooves to a point on the surface of the tooth where a perfectly smooth finish of the filling and tooth surface may be made.

This constitutes the important feature of preparation in this group of cavities, as they are generally simple cavities, having surrounding walls, and all that is needed to complete the preparation is that the floor be cut flat with the flat end of a fissure or inverted-cone bur, and that the enamel wall be cut in a direction parallel with the enamel rods, with a slight bevel on the outer fourth of the enamel. Undercutting for retention is not necessary if the walls are practically parallel, which will generally be true if the floor is prepared with the inverted-cone or fissure bur as directed. Note that cavities in this group do not require extension for prevention, nor do we find recurring decay after properly preparing the cavity and placing a good filling.

Group 2 includes all proximal cavities and those occurring on the gingival or cervical third of buccal, labial and lingual surfaces following the gingival line. This group of cavities occurs as the result of uncleanliness of the surfaces, due to their inaccessibility to the excursions of food and the cleansing action of the cheeks, lips, tongue and tooth-brush. That we may locate the labial, buccal and lingual margins of proximal cavities with the least possible sacrifice of tooth substance, we must examine the form of the two proximal surfaces and their contacts and consider the habits of the patient as to the care of the teeth, that we may locate the nearest axial line angles (those angles formed by the junction of the proximal with the labial, buccal and lingual surfaces). It should be our aim to

cut to this line, which we may recognize by the fact that the enamel is clean and perfect, and we can readily see that the margins located at this point are exposed to the excursions of food in mastication. If these margins are located at the point where they are continually cleansed in mastication they will also be benefited by the cleansing movement of the lips, cheeks, tongue and tooth-brush. You will readily appreciate that all proximal cavities will not be equally large bucco-lingually, as the size of the cavity labio- or bucco-lingually will depend upon the form of the two surfaces making contact. For example, if these surfaces be very broad and flat bucco-lingually we shall be compelled to cut the cavity wider to locate our margins, buccally and lingually, of close contact that they may be accessible to the excursions of food in mastication. In these conditions it is important also to remember that a better filling may and will be placed generally, because of the accessibility of these margins and walls, enabling the operator to do much better work. The opposite condition favoring the minimum extension bucco-lingually would be proximating surfaces, which are markedly convex bucco-lingually, having a narrow contact and embrasures widening rapidly to the buccal and lingual. In these cases the habitually unclean area is very narrow, and in preparing the cavity the condition would not require much extension to the buccal and lingual of the contact of the teeth, as a considerable portion of the proximal surfaces in such a case would be accessible to the excursions of food.

Generally speaking, the maximum amount of cutting required in proximal cavities of all teeth, carrying out extension for prevention in its fullest sense, as advocated by Dr. G. V. Black, would be to cut to the nearest angle of a tooth, the line angle formed by junction of the proximal with labial, buccal and lingual surfaces, as by observation and experience these angles have proved the safest point at which to locate the labial, buccal and lingual margins in proximal cavities, and the mesial and distal margins of gingival cavities. In teeth with normal contacts decay on the proximal surfaces always has its beginning gingivally of the contact point. This is sufficient reason for always locating the incisal margin or angle of a simple mesial or distal cavity in the six anterior teeth just incisally of the contact point. It has also been proved by experience that decay does not occur on surfaces protected by healthy gum tissue. For this reason we should make it our aim to extend

the gingival or cervical margins of our cavities just beneath the free margin of the gum, if there has not been excessive recession by disease or age. This requirement applies equally in gingival cavities on labial, buccal and lingual surfaces.

In cutting the gingival margins of a cavity to locate it beneath the free margin of the gum, it is always wise to leave a portion of enamel between the margin of the cavity and the gingival line of the tooth if possible. The enamel being so much harder than the cementum of the root enables us to secure a more perfect finish of the filling and avoids the great liability of over-trimming in finishing with knives, files and sandpaper discs, as would be the case if these margins were located in the soft cementum. A depression left by over-trimming at this point would permit food to lodge and be retained, which would result in recurring decay. For the reason mentioned, it is advisable that the junction of the gingival margins with the labial, buccal, lingual, mesial and distal should be cut in very short curves and located on the axial line angles of the teeth, this being the cleanest part of the necks of the teeth. Most failures due to recurring decay are found in these localities and result from insufficient extension of these angles to the labial, buccal and lingual, that they may be protected by the prominence of the angle of the tooth. In those cases in which we find considerable recession of the gum, and in which to carry out the above requirement would result in great sacrifice of tooth substance, we may locate the gingival margin at a point where the interproximate space is sufficiently wide to permit free use of an ordinary wooden tooth-pick along the full length of the gingival margin, and this use of the pick should be recommended to the patient in these cases.

Faulty preparation of the floor or seat of those cavities in which the fillings are exposed to the force of the bite is a common cause of failure. The rounded or concave form given to the floor of these cavities is the chief cause of failure, which fact is readily appreciated when we consider the tremendous force to which these fillings are exposed, varying from 100 to 300 pounds. In testing the bite, using the molar teeth for this purpose, we find as many people able to bite over 200 pounds as are able to bite less, and very often 270 pounds is reached, this being the limit the Gnatho-dynamometer will register. Meats require for their proper mastication from 30 to 100 pounds, and it requires a force of 100 to 150 pounds to crack some nuts—

filberts, for example. The power required to masticate various foods, as well as for other purposes, is exerted without any discomfort by most people having good teeth and healthy peridental membranes, and is a fair estimate or measure of the force to which our fillings are exposed. If in the mastication of meats we accidentally bite on a bit of gravel, shot or bone, it will be fair to say that a force exceeding 200 pounds is exerted, and we generally experience a severe jolt under these circumstances. If this accident should occur on a proximo-occlusal filling it would severely test the resistance and retention form of the cavity and the strength of the filling material. These facts will impress upon us the importance of considering the resistance and retention form of a cavity exposed to the force of mastication, and we will readily appreciate the necessity for the formation of a flat seat, that we may most effectually resist this great pressure. The floor or seat of all such cavities should be cut flat and in a plane at right angles to the direction of the force. With such a preparation there would be no disposition of the filling to slide or move in any direction under the force of the bite, and there will be much less strain brought to bear on the retention form of the cavity. The preparation of the floor or seat of a cavity is best made with the flat end of an inverted-cone or fissure bur, held with the handpiece parallel to the long axis of the tooth. Cut in this manner the floor will be flat, with definite angles at its junction with the surrounding walls. This angling would be all the retention form needed in simple occlusal, labial, buccal and lingual cavities, but let it be understood that this squaring out for retention in all instances must be in the dentin, the form of the enamel wall being a separate and distinct consideration, and is prepared by cleaving the enamel in a direction parallel with the enamel rods and cutting on its outer fourth a slight bevel to insure removal of enamel rods unsupported by dentin, and a strong enamel margin against which to place the filling. In deep occlusal cavities we may not find it possible to cut the entire floor flat, as the depth centrally would expose the horns of the pulp if extended. In such a case we may prepare a flat seat where the floor joins with the surrounding walls, leaving a concavity in the center; this shelf will serve as a seat for the filling.

Objections may be raised to this squaring out of cavities and the forming of definite angles as described, on the ground that angles cannot be as perfectly filled with gold as a rounded groove or cavity,

also, a rounded form of the cavity has been considered desirable on account of the spheroiding tendency of amalgam. Both of these ideas are wrong. It has been conclusively proved by a long series of laboratory experiments that square angles can be filled by the use of ordinary plugger points and a proper direction of force much quicker and better than with a rounded form of the cavity, because there is no disposition of the gold to curl or ball up in filling these square angles, a difficulty so common to those who attempt to fill a cavity with a concave floor. This balling up of the gold is caused by condensing it against a surface inclined to the direction of the force of the plugger, and is overcome only by the operator holding the filling until the entire floor of the cavity is covered and the mass anchored between the surrounding walls. In the absence of force amalgam as used for filling will not change its shape and there is no tendency to spheroid. The curling from the margins of a cavity so often seen in amalgam fillings is due to flow of the filling and is caused by the filling crawling or moving under the force or weight of the bite; this fault has been interpreted as spheroiding. This condition was much more common a few years ago, when the slow-setting silver-tin amalgams were so popular with the profession, these amalgams flowing very much more than those generally used at the present day.

If it is possible to fill square angles, there is also impressed upon us the importance of resorting to square grooves for retention purposes, instead of the rounded form. Grooving for retention purposes is practically confined to mesio- and disto-incisal cavities of the incisors and cuspids. A square groove offers retention in its entirety, whereas a round groove offers no retention until it is deeper than its diameter. This may be illustrated by cutting a groove half a millimeter deep with a bur one millimeter in diameter; this groove is not retentive, but if such a groove were cut half the depth and squared out it would give an abundance of retention.

BLEACHING TEETH.—Success in bleaching the teeth demands recognition of the fact that each special case presents its peculiar characteristics, and that the problem is a chemical one always, as the bleaching method in any case must be selected with special reference to the character of discoloration and applied with care, for without that care success is impossible.—S. A. ALDRICH, *Penn. Dental Journal.*

PORCELAIN INLAYS AS VIEWED BY THE COUNTRY DENTIST.

BY E. H. ALLEN, D.D.S., FREEPORT, ILL. READ BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT BLOOMINGTON, MAY 12-14, 1903.

No one in this day will deny that the porcelain inlay has its place, but that it has all the degrees of perfection claimed for it by those most skillful in its production is still open to discussion. However, every great epoch in the history of the dental profession has been created by the enthusiasts, so I would not criticise even the extreme views of some of the porcelain workers.

As regards the viewpoint of the country dentist all admit the esthetic features of a porcelain inlay and realize that it requires a great amount of skill to make one. Viewed from the point of dollars and cents the work does not pay because it takes too much time, and in that time more dollars can be made in gold or amalgam fillings, rubber plates, crown and bridge work, etc. The ideas of the country dentist are entitled to every consideration, for he has a mixed class of people as patients. One might appreciate a porcelain inlay in every respect, and be glad to reimburse the dentist in his efforts in an esthetic direction, but the next three or four might show no appreciation whatever, and experience has taught him that it is expensive to attempt to teach these people the esthetic side of life. Furthermore, the country dentist does not get enough of this kind of work to do to become more than ordinarily proficient, and all will agree that the production of even an ordinary inlay requires a skill which comes only from constant practice.

The question as to what the country dentist should do with porcelain is yet unanswered, but I would urge him to go ahead with the work, even if it does not pay at first, and not to be discouraged by a few failures. By persevering in a work which at the present time is popularly supposed to be done only by city experts the country dentist will be brought to take a more comprehensive view of his daily practice and will become more proficient in all his other lines of work. There is an increasing demand for porcelain, and he must furnish it or suffer the loss of practice.

Personally I find porcelain a vast subject, and have abandoned the idea of grasping it at one stroke. I do not expect to see the day when all filling materials will be abandoned for porcelain, but I am inclined

to look with favor on the claims of the enthusiasts, although I do not agree with them in all particulars. It seems to me that because a small inlay is difficult to handle the average worker is inclined to cut extensively, so that instead of a small gold filling we have a large inlay. Some inlay workers at least sacrifice too much tooth structure —much more than is done by the rational "extension for prevention" operators. The dentist who judicially uses that filling material which in each case comes nearest to being the ideal will be the most successful, and such a man will use inlays, gold, cement, amalgam, etc. Porcelain inlays should be used with good judgment, and that is acquired by experience. Porcelain should not be condemned simply because the operator does not know how to handle it. A perfect-fitting inlay, with color well blended with that of the natural tooth, and properly set with good cement under pressure, gives a result of the highest degree of excellence from the esthetic standpoint, and will serve very well as a tooth preserver. Such can be made by any practitioner of ordinary ability.

Discussion. *Dr. W. H. Taggart, Chicago*: The country dentist, like the country physician, must be a better general operator than the city practitioner. The city dentist's patients do not know each other, and perhaps never meet except at his office, but in the country they are all well acquainted and the dentist furnishes one of the chief topics of conversation. I may be an enthusiast on the subject of porcelain, but my position is one of conservative enthusiasm. I started in this work with the idea of inserting inlays for people who appreciated them from the esthetic standpoint, explaining that the advantage of the beautiful appearance given to the mouth would outweigh the fact that the inlay might not be so good a preserver of the tooth as a filling. This gave my patients confidence in my honesty, and I have found inlays quite as durable as fillings. Gold fillings that I put in during the last fifteen or eighteen years have come out, whereas porcelain inlays inserted eighteen years ago are as good as they ever were, and they are still preserving the teeth. Gold fillings as defective as those porcelain ones would not last three months. The fact that the gold is merely in close contact with the tooth structure permits of an almost imperceptible passage of moisture, and even what is considered a perfect gold filling will leak in time. No one ever saw a cement filling leak, although it may dissolve out. Capillary attraction cannot take place. If decay should start at the cer-

vical border, which I have never seen occur in a good porcelain filling, it could be treated the same as any other cavity. We would not take out a gold filling because a little pin point of decay commenced at the cervical margin.

Porcelain will never take the place of gold or amalgam, but there are times when it will accomplish what these materials can never do. During the past month I inserted eight large porcelain inlays in molars which a few years ago I would have crowned, but do not infer from this that I would fill all kinds of cavities in molars with porcelain, because some of these teeth are so broken down that they need a crown. Porcelain imparts strength, and when you can put in a restoration extending from the gum line to the cutting surface of the tooth you have a block of porcelain sufficient to give strength to the tooth. If your mechanical skill is sufficient to make that inlay fit you are in a better position to give satisfaction than with an ordinary filling or with a crown when you have a defective line below the whole circumference. No matter how well a band is fitted it will be a failure if it is weak below the gum line. In these large cavities two-thirds of the gum line is perfect, and with an inlay you deal only with an imperfect third and not at all as in the case of a band. It would be impossible to get such perfect results with amalgam.

As regards the different grades of porcelain I use whichever will do the most good. Low-fusing porcelain with a gold matrix is just as strong as the high-fusing and quite as advantageous. In small proximal cavities in front teeth, labial cavities easy of access, where little contouring is necessary, in cavities where we put what are called simple gold fillings, I would use the low-fusing. In large cavities I would use the high-fusing, not because it is stronger, but because by my method the inlay is more apt to be correct with a platinum than with a gold matrix. In these small cavities where a gold matrix can be used I do not stop to take an impression. Difficult cavities, proximal cavities extending down to the crown surface in bicuspids, the corner of a central incisor, or any great amount of restoration require high-fusing porcelain, because it is less apt to run away and not so likely to become globular.

I have always felt that there are so many curves and angles that it is impossible to properly or easily burnish a matrix, and burnishing has a tendency to turn up the edges, especially in platinum. The fact, however, that the matrix is used with the die and counterdie makes

it possible to swage. Impressions should be taken with a proper material—with one that will not give or spring. If the cavity is properly prepared it will come away easily, but otherwise it will not. In taking the impression I leave as much overlap as possible and then imbed it in modeling compound about one-eighth inch, next backing it up with amalgam, and when the amalgam is hardened I dissolve off the cement with strong ammonia, which gives a perfect die. After swaging the matrix perfectly to the die I anneal the metal several times until it is soft on the die, which obviates softening it again when it and the inlay are put in the furnace.

As regards color, don't be discouraged because of the fine distinctions some dentists are making in regard to underlying colors, for such distinctions cannot always be carried out in practice. The art in putting in porcelain inlays of proper color consists principally in knowing how much change to make so that the modifying influence of cement will bring out the proper shade. Coloring of inlays depends largely upon getting them light enough that the darkening influence of the cement will bring about the desired result. An inlay for a proximal cavity without contour must be made much lighter than the tooth, so that when the light is shut off the inlay will match its surroundings. When the corner of a central incisor is built out there is little difficulty in picking the right shade regardless of the color of cement. The tendency of the average dentist to use a cement of the proper color to rectify his mistake in the shade of the inlay is all wrong. Better settle upon some one color of cement and then learn just what range of shades to use in the porcelain. Even if the cement matches the tooth it will change in time, and inasmuch as anything that stains the teeth will stain the cement it matters little what shade is used. As regards porcelain work, I am like the Irishman, "satisfied, but not contented."

Dr. W. T. Reeves, Chicago: Dr. Allen says that the country dentist does not get enough of this work to become proficient, but there is no class of operations that will bring him such quick returns as those with porcelain. Patients appreciate it and tell their friends about it, as well as pay a larger fee, so any man who takes it up in earnest will soon have all he can do. I believe it possible for every dentist to acquire sufficient skill to make an inlay that will fit, and the matter of dollars and cents is decidedly in favor of those who are doing the porcelain work.

The sulci of the bicuspids and of the superior molars, no other surface being involved, the cingulum of the anterior teeth, pin-head cavities that are out of sight, all of which can be easily prepared, may be safely filled with gold, but in all other cavities porcelain will give the best service. Porcelain work is limited only by the ability of the operator.

A man who takes up porcelain must have a high standard to work to, which fact will benefit him, his patients and his profession. How often we see teeth where no separation was made for gold or amalgam fillings, but the inlay worker must separate in order to have working space, and having obtained it he can contour and restore contact points in a way unequaled by any other method. I do not believe there is one dentist in this country but who could do twenty-five per cent better work with inlays than with gold fillings if he would give but one-tenth of the time to learning the manipulation of porcelain that he did to gold.

I believe that burnishing gives more accurate results than swaging. In swaging you get several stages away from the original, which certainly cannot give as accurate results. As the last step in burnishing I draw a strip of rubber dam tightly over the matrix, and this holds every portion firmly in the cavity and obviates any spring. There is less displacement of the molecules in burnishing than in swaging, but after the final burnishing I always anneal the matrix so as to restore it to the soft condition.

The shades in a tooth underlie each other, and as you are able to see them and to place them in their relative positions in the inlay your work will be more or less successful. As regards Dr. Taggart's illustration of a corner restoration where the light can go through, the inlay should be baked in layers, making practically two inlays, one for the lingual and the other for the labial half, so that the light will be refracted.

Dr. J. G. Reid, Chicago: I cannot believe that a substance so brittle as porcelain can be universally made to take the place of good gold fillings. Where heavy force of mastication is brought to bear upon the thin edges of porcelain they will fracture, and all such fractures will eventually cause the failure of the work. Some porcelain enthusiasts have said that gold pluggers should be thrown out of the dental office, as there would not be any use for same with porcelain in the field. Men who will make such statements may be

enthusiasts and not cranks, but they are altogether too enthusiastic for me. I believe porcelain inlays are indicated in certain localities, but I do not think they should be used to the exclusion of all other filling materials.

Dr. C. E. Bentley, Chicago: Dr. Reeves has taught me all I know of porcelain inlay work, and I have closely followed and watched his methods for a number of years. The degree of perfection he has reached gives some semblance of sanity to his plea for placing porcelain in practically all cavities. With his skill he may be justified in what he calls his optimism, but there is such a thing as a professional optimist—one who is optimistic at all times, and there is also such thing as a healthy pessimist—one who shows pessimism when optimism transcends sane lines. Dr. Reeves has frequently stated that porcelain inlays should be placed in practically all parts of the mouth, and I believe that he is able to do it, so the pernicious effects of that doctrine do not fall upon him but upon the rank and file of the profession. The young graduate takes up porcelain upon the word of the enthusiast, and ignominious failure follows; even the operator of average ability will come to grief if he follows such untempered advice. Every teacher of operative dentistry must give up teaching if we all follow the radicalism of Dr. Reeves. Gold fillings often last thirty, forty and even fifty years, and if with increased manipulative ability and greater knowledge of the scientific preparation of cavities, we find that gold fillings are doing the work, why should we forsake a tried and true friend for a new and comparatively unproved material? Even the means of attachment of inlays is an uncertain quantity in a large number of cases, for cement is as yet unreliable. There are places where gold fillings are contraindicated and where porcelain is the very best thing we can use. Porcelain has come to stay and we should calmly investigate it and determine how far to go for successful results, but until it is proved we are not warranted in making rash statements and substituting it for everything else.

Dr. Edmund Noyes, Chicago: The porcelain which we have been using for forty years in artificial teeth, crowns, etc., is not strong enough to take the place of natural enamel and dentin in the mouths of hard biters. Excepting that it is supported in many cases more perfectly by its foundation, why is the porcelain inlay not subject to the same weakness? The brittleness of the edges in a piece of porce-

lain resembles closely the enamel of a tooth at the margin of a cavity. An important element in the strength and durability of gold fillings is the fact that we can bevel off the margin of enamel so as not to leave any square corners, but you cannot for a moment protect enamel in that way with porcelain. The enamel joint in porcelain inlays is more like the joint between amalgam and the enamel margin. This is easily managed in many cases, where there is no strain and where it is possible to make a right angle at the margin, but how about those cases where the enamel cleavage compels you to make a cavity margin that is flaring, and in which you must either leave short enamel rods at the margin in order to secure a perpendicular wall or have a thin edge of porcelain fitting against it? Porcelain work will take a step in advance when we arrive at the clinical, physical and scientific reasons governing its scope and limitations.

Dr. J. W. Cormany, Mt. Carroll: City practitioners must realize that the country dentist has patients drive in from twenty to thirty miles away and they want all their work done that day. The average country dentist can put in a gold filling in thirty minutes, but he cannot make an inlay in that time, although Dr. Reeves may be able to do so.

Dr. G. V. Black, Chicago: Wherever the susceptibility to decay is great the power of porcelain to limit caries will be less than that of gold. Susceptibility is greatest in youth, so we should be very careful about placing porcelain inlays in the mouths of our young patients. Even the most skillful cannot attain the same ability in working porcelain that they can in gold. The legitimate field for porcelain work is in the mouths of those who have reached the period of immunity from decay, as there the inlays will last and will give better satisfaction because they look more presentable. Inlays are indicated in the anterior teeth of singers or public speakers for the esthetic effect. In the case of teeth that decayed badly during youth, that have large fillings in them, and that have been breaking down more or less, and where we find the beginnings of disease in the peridental membrane—phagedenic pericementitis—porcelain inlays may be used with certainty, and they will relieve the sore peridental membrane from the irritation of the mallet. There is merit in porcelain, and if properly handled it will last, but I fear the enthusiasm of some for it may destroy its usefulness.

Dr. Reeves: If there is one place more than another where porce-

lain does well for a patient it is in the mouths of those children who are extremely susceptible to decay. The inlay is absolutely immune to the accumulation of gelatinous plaques, but the gold filling tarnishes and collects same. Furthermore, the inlay can be put in with the minimum of suffering to the patient.

Dr. F. H. Skinner, Chicago: Inlays as small as any gold fillings can be inserted if you are particular in the work. There is no need of using several models, as the first one is available and close enough to the cavity. I prefer a matrix made from an accurate impression swaged from a fairly accurate model rather than an imperfectly burnished matrix in a difficult cavity. The defects of cement are more apparent in setting crowns than inlays, for the latter can be kept dry while the former can not.

Dr. R. B. Tuller, Chicago: One advantage of porcelain work has not been emphasized, namely, the fact that both operator and patient are saved time, strain and suffering when inlays are used. Frequently the patient may leave the office while the inlay is being made and return later.

Dr. Black: The placing of porcelain inlays in the teeth of young people, especially those susceptible to decay, will bring you heartaches, and the same skill in using gold will do more for these patients and do it better in every sense. I say that from a long experience in clinic work, from a careful study of caries, and from an extended observation of the enthusiasm of dentists which carries them beyond legitimate bounds in the use of new things.

Dr. J. N. Crouse, Chicago: I desire to emphasize what Dr. Black says about enthusiasm, as I have lived to see three or four great changes in methods of practice and the injury done by extremists.

Dr. C. N. Johnson, Chicago: Inlay work is the most exacting and requires the greatest discrimination of any line of procedure that we are called upon to perform, and I deplore some of the statements made in favor of it, as they are bound to mislead the young men. If I were convinced that the methods I have taught all these years are all wrong and that porcelain inlays are all right, I would renounce my previous teachings, but I do not believe any such thing. The principle of inlay work covers more materials than porcelain, and gold inlays will not only give better service than porcelain but there is a wider range of usefulness for them. They are especially indicated in the posterior teeth where the stress of mastication plays

a part. I believe that porcelain work has an increasingly important place in operative dentistry, but we must be honest in the matter both with ourselves and with our patients.

Dr. Allen, closing discussion: I believe it is a fact that inlays set with cement are most compatible with tooth structure, as the causes of decay do not have the same chance as with other materials. I believe that the swaging method is the better. Dr. Reeves' statement about gold fillings is rather strong. In a few years from now he will be using more gold and amalgam than he dreams of at this time.

ESSENTIAL OILS.

BY J. R. SHANNON, D.D.S., WEEPING WATER, NEB. READ BEFORE THE NEBRASKA STATE DENTAL SOCIETY, AT LINCOLN, MAY 19-21, 1903.

It is not my expectation in this paper to offer you anything new or original, as I have merely tried to collect some information about the essential oils, that we may become more familiar with their uses and action. There is some difference of opinion as to their merits and demerits, yet they seem to possess many qualities that make them desirable agents for use in the oral cavity, and they cover such a range in their action that all pathological conditions of the oral cavity may be treated by them singly or in combination.

Their diffusibility is a quality that renders them most valuable agents. They do not coagulate albumen, and the most delicate canals may be washed by them without any danger of being clogged. It has too often been the habit of the dentist to select one of these oils with merely its antiseptic property in view, considering them simply as a group of antiseptic agents, and selecting indiscriminately without regard to their action further than being able to destroy the microorganisms or their products, never thinking of their action on the surrounding soft tissues. Recent experiments have made it possible for us to choose from them more intelligently and take only those that are applicable for the case at hand. What success can we hope to meet with if we seal in the tooth an agent potent enough to destroy all forms of bacteria, if it be of such a nature that its contact with the soft tissue would only cause an aggravation of the condition?

With the oils classified for us, both as regards their antiseptic potency and their therapeutic action on the surrounding soft tissues,

we should be able to choose only those that are suitable for the case. They may be classified as follows: *First*—Irritating or stimulating antiseptics, and in this group are oils of cassia, cinnamon, and myrtle. *Second*—Quieting, soothing or sedative antiseptics, as oil of cloves. *Third*—In this group eucalyptol, cajuput, Black's 1-2-3 are neutral agents.

In selecting these oils for the various cases it is necessary that their selection be made intelligently and with a knowledge of their action other than that of antisepsis. It would not be good practice to use in a tooth as a dressing an oil that is so powerful as to destroy all infectious material of the pulp canal and at the same time so irritating that its contact with the soft tissues would produce in a short time an inflammatory condition resulting in the formation of a blister. Is it not also important in treating a condition where inflammation already exists to select an agent that will be not only antiseptic but soothing, and that will not aggravate the pathological conditions and continue the inflammatory movement?

If the antiseptic quality alone is to be considered, oil of cassia is the most potent, also one of the most irritating. It may hardly be safe to advocate its use, for I am well aware of the criticisms and objections to it, the discoloration of the tooth being the principal one. Where a potent antiseptic is indicated, one that is diffusible and will penetrate without coagulation, this oil is desirable. It seems unfortunate that so potent an antiseptic as cassia should possess such irritating qualities, yet there are cases where such agents can be used to advantage. In treating a chronic abscess, where the cellular activity of the entire fistulous tract is dormant and the use of mild antiseptics fails to accomplish the desired results, cassia may be used in solution or full strength, forced through the tract, and will hasten the activity of the tissues to return to a normal condition. In treating cases of pyorrhea, where the same conditions exist, it can be used to good advantage, or in the treatment of any tissue where a good antiseptic and stimulating agent is needed.

The oil of myrtle, belonging to this same class, does not possess these qualities to the same degree, yet is of sufficient potency to be of great value. While it is too irritating for general use, it may be employed to good advantage in treating the soft tissues where there seems to be some inactivity of the cellular tissue, following the

formation of a blind abscess; and where the best results can be obtained by sealing it in the tooth for a few days. It will not aggravate the condition nor overstimulate the parts, but merely excite the cellular activity necessary to restore it to a healthy condition.

Oil of cloves belongs to the group of sedative, non-irritating antiseptics, and is one of the most useful of the essential oils. It is absolutely non-irritating, even when kept in contact with soft tissue for some time. Even when applied to inflamed tissue it imparts a quieting and soothing effect not obtained by any of the other oils. As an antiseptic it ranks along with campho-phenique and creasote, and is sufficiently potent to destroy most forms of bacteria found in the treatment of pulpless teeth. The combination of these two qualities renders it a most desirable agent in treating teeth where the infection has passed through the apex and set up inflammation in the surrounding tissues. It may be sealed in root canals without fear of aggravating the condition, but its quieting effect will soon be noticed in its restoring to a normal condition those tissues wherein lie the seat of trouble. Dr. Peck says his experiments have proven that in cases where any soreness or irritation follows its application it is due to an inferior quality of oil or one that has been adulterated, and the irritation is due to the materials used for adulterating purposes.

Cajuput, eucalyptol and Black's 1-2-3 compose the third group and are the neutral agents, as they do not irritate the parts, neither do they impart a sedative action to the inflamed tissue. The 1-2-3 is the most potent antiseptic and the one perhaps used by more dentists than any other agent. There seems to be no condition about the teeth where a sedative or irritating agent is not indicated to which this remedy is not applicable. Cajuput is slightly antiseptic, and being a solvent of gutta-percha is used to moisten the walls of the root canals before filling with gutta-percha points.

Eucalyptol is the active principle of oil of eucalyptus and is perhaps more commonly used than the oil. It is non-irritating and only a mild antiseptic. Combined with iodoform, it is used as a root-canal dressing. In this connection the odor of iodoform is so disguised that it is not objectionable, and the combination is said to be a very effective one in treating putrescent canals. Eucalyptol, although not a powerful antiseptic, is potent enough to maintain an aseptic condition where it is desirable to defer the filling to some

future time. Being a good solvent of gutta-percha it is used to moisten the canals before the chloro-percha filling is inserted or to moisten the walls of a cavity before the gutta-percha or temporary stopping is packed in it.

After the use of any of the oils the cavity should be well washed with alcohol before the insertion of cement, as they prevent its adhesion. Considering their range of action as antiseptics, their irritating and sedative action, diffusibility, and absolute freedom from any injurious effect to the patient from any accidental contact with the mouth, they comprise a group of agents which are very important to dental materia medica.

GAINING ACCESS TO THE PULP CHAMBER OTHER THAN THROUGH EXISTING CARIES OR PREVIOUSLY PLACED FILLINGS.

BY J. C. CURRY, D. D. S., PHILADELPHIA. READ BEFORE THE PENNSYLVANIA STATE DENTAL SOCIETY, AT WILKES-BARRE, JULY 7-9, 1903.

The operation of opening into and removing the contents of the pulp chamber and root canals is one which the dentist is called upon to perform so frequently and on which so much depends that the writer does not hesitate to place it among the most important of dental operations. Moreover, since its success depends on so many nice considerations of method and detail, both as regards its immediate success and the future treatment of the tooth, I trust my hearers will feel that a few minutes may be profitably spent in its discussion.

The desirability of gaining access to the pulp chamber other than through existing caries or previously placed fillings, in other words, through "taps," was undoubtedly taught long before the advent of your humble servant. This statement is not made with any idea of proving his youthfulness, but as a positive disclaimer against any charge of attempted originality. Dr. Flagg taught the desirability of making taps over thirty years ago, and reference is made to it in his book on "Dental Pathology and Therapeutics," page 66, and the method I shall speak of to-day is practically the same, except that I do not advocate making taps through occlusal surfaces if it can be avoided.

Notwithstanding the fact that the making of taps was taught years ago, I am inclined to think that within the last twelve or fifteen years the method has not been practiced as much as formerly. This is, no doubt, due to the teachings of the advocates of root-canal reaming, who earnestly if not wisely urged that all canals be reamed to their apices, and to do this it was of course necessary to cut on a straight or nearly straight line. All molars and bicuspids were thus opened from the occlusal or *deep* approximal surface, thus weakening the tooth greatly, making cusp cleavage liable, and risking perforations or broken drills, sometimes both.

The advantage of making taps will be argued in the following cases—*First.* When the cavity of decay is difficult of access, or when to reach and empty the pulp cavity it would be necessary to cut through the dentin covering the pulp chamber, especially in bicuspids and molars having deep cusps and constricted necks.

Second. In molars and bicuspids having large approximal fillings extending across the sulci in occlusal surface, if said fillings are in good condition.

Third. In teeth having exposed pulps that require arsenious application, if said application cannot be safely and comfortably made over point of exposure.

Fourth. In the teeth of patients in poor health or of low grade temperament.

Fifth. Where tooth is exceedingly tender to pressure except from point where tap can conveniently be made, or if for any reason the operator can do better work or operate more comfortably by so doing.

In many or all such cases the writer would advocate gaining access to the pulp chamber through taps for the following reasons—

First. Taps can be made at the least possible sacrifice of tooth strength because, (a) the cutting may be done on a line with the radiation of dentinal canaliculi; (b) the tap may be made round or oval, thus presenting the form of an arch in the direction of greatest stress; (c) location selected for making tap may be at a point where tooth wall is thinnest.

Second. Taps are especially recommended because of the directness with which root-canal openings can be reached through them.

Third. Taps admit of root-canal treatment being made with the rubber dam adjusted, thus protecting the tooth from ingress

of germs and safeguarding the patient from accidental injury to adjacent parts from escaping remedies.

Fourth. Access to pulp chamber through a tap is sufficient to permit thorough removal of contents of both the chamber and canals, and as the present system of antisepsis renders canal reaming unnecessary, entrance need not be on a line with canals.

Fifth. Work previously placed, probably at a great cost of time, comfort and money, need not be disturbed.

Sixth. The removal of canal dressings can be accomplished readily should re-treatment of tooth ever become necessary.

Seventh. The certainty of finding chamber and canals within minimum amount of cutting.

Discussion. *Dr. H. C. Register,* Philadelphia: I am opposed to the idea of gaining access to the pulp chamber otherwise than by means of an existing opening. I dislike to speak in open meeting of anything that I have personally done, but the method which I have pursued almost as a specific for so many years, and which I demonstrated at Cresson Springs in 1876, has been sufficient to bring out the correct anatomical point of approach and the use of acids for obtaining entrance. At that time I demonstrated the use of sulphuric acid for opening canals, but at that early age I hesitated to confess in open meeting to using an acid for this purpose, so the matter was overlooked for several years and Dr. Callahan later brought the practice to the notice of the profession. There may be better ways, but the approach to pulp chambers and canals can be easily obtained by this method in connection with the use of compressed air heated. Gangrenous pulps will be in a gelatinous condition and atomization will remove all of the matter. However, this should not terminate the operation of cleaning canals. Dr. Curry disapproves of reaming, but so far as practicable I think all canals should be reamed, for if there is a remnant of pulp tissue it will cling to the walls, and if left will seal up the dentinal tubules and render the fibrils septic. I do not think that all the trouble with pulpless teeth comes from the substance which formerly filled the canals, and to put so much stress on the removal of the entire pulp and ignore the basis substance of the dentin is a great mistake. In voluntary pulp removals the basis substance is at once fixed, but in gangrenous pulps osmosis must be controlled.

Dr. H. W. Arthur, Pittsburg: The essayist sums up briefly the

advantages and reasons for advocating the practice, to which we can but assent. The paper, however, falls short in that it does not give the points of direct approach to the pulp chambers of the several teeth, nor does it give the method of procedure in tapping. I do not understand why Dr. Curry would not tap from the occlusal surface, as the most direct approach to the canals would certainly be through same. Not infrequently we meet with cases where fracture of the buccal or lingual portions of a tooth has occurred, which might have been avoided if tapping had been resorted to. In many cases judgment is required for applying this practice, and same must be founded on a knowledge of the anatomy of the teeth, especially as to where the opening to the pulp chamber should be made and as to the location of the orifices of the canals. The essayist said he would not make the entrance large, but it should be sufficiently so to bring the canal openings in view. In opening up a pulp chamber care should be exercised not to break up the subpulpal wall, and this can be exposed without being disturbed by the use of a spear drill to open the chamber and a bud bur drill to ream away the wall. Where the pulp is devitalized the canals can be opened and their course be followed with a fine probe.

Dr. Curry, closing discussion: I use large openings where it is desirable to do so. I am sorry Dr. Register did not have the courage of his convictions and so obtain the credit of inaugurating the use of sulphuric acid. I would suggest that he use Schreier's preparation, as it removes all the organic substance from the tubuli by emulsifying it. I do not attempt to approach the pulp chamber from the occlusal surface, as that is the thickest part of the tooth, and tapping there would weaken what nature intended to be the strongest portion of the crown.

SOFTENED DENTIN UNDER FILLINGS.

BY H. T. KING, D.D.S., FREMONT, NEB. READ BEFORE THE NEBRASKA STATE DENTAL SOCIETY, AT LINCOLN, MAY 19-21, 1903.

In the DENTAL DIGEST for March, 1902, p. 181, I read an article by Dr, John J. Requa, entitled "Is Decalcified Necessarily Devitalized Dentin?" A continuation of the old but never-settled controversy as to whether or not it is good practice to leave a little softened dentin in deep-seated cavities.

It has always been my practice to do so when the removal would endanger the pulp, resulting in its probable devitalization with all the attendant complications, and I do not believe decay ever recurs unless the active elements necessary to cause it gain access to partially decalcified dentin from marginal leaking. If that should occur, and it may easily do so in time, then I am willing to admit that caries will run riot and the breaking down of the tooth be much more rapid than if perfectly sound dentin had been reached in excavating.

I cannot help but believe that this procedure is as common to-day as ever, for I notice that in answer to the question, as sent out by the New York State Society through its Committee on Practice, seventy-five per cent of those answering stated that they believed in and constantly practiced it. Mind you, these men were not the lazy ones of the profession, but picked men who had been in practice long enough to know of the faith that is within, and I believe, judging from their standing, they do what they do because they think it is the best and right thing to do. Just one example—Dr. Joseph Head says: "I most unreservedly desire to say that I leave decalcified dentin in cavities when the pulp would otherwise be exposed, and find that such dentin treated with antiseptics not only tends to conserve the life of the pulp, but also tends to take upon itself lime salts that cause softened dentin to harden." I claim this last to be true and will speak of it later.

First, let us see why some claim so very emphatically that all trace of decay must be removed or caries will continue under filling. Dr. Ottolengui, in the second edition of his work on "Methods of Filling Teeth," says it is "malpractice to fill over the least particle of decay." Hardly any one would state it stronger than that, and we will see if his argument in support of the proposition will stand. He accepts the theory that it is the acid excretion or by-product of certain forms of microorganisms that disintegrates the substance of the tooth, and that these bacteria penetrate the tubuli beyond the visible evidence of decay. He says that no germicide is known that can safely be used strong enough to destroy bacteria so situated, at least not at one sitting, and that if all infected dentin be not removed, or if live bacteria be left, decay will continue even if the filling is so well made as to exclude all external influences. The last statement is the one I wish to controvert.

What do we find the physiology of the microorganisms with which we are dealing to be? *First*—They have a digestive apparatus by which they break up certain food particles. *Second*—They assimilate this food to their nourishment and growth. *Third*—They throw off a definite waste product (lactic-acid). *Fourth*—They have the power of reproducing their own kind.

It is my claim that the conditions necessary to carry on this life history do not exist in a tubule sealed up by a perfect filling—not because air is excluded, for it has been found that these bacteria are practically anaerobic, but from want of the proper food supply. I am aware it has been claimed that they may live on the contents of the tubule; but if this had been proven to be true it would have no bearing on the production of decay, for while Dr. Miller found that the organism could live and grow in beef extract, it was not at home there, and unless sugar was present *no acid was produced.* As it is the acid and not the bacteria themselves that breaks down dentin, then no acid, no decay. No point in the micro-organism theory of decay has been more clearly proven than that the natural food of the bacteria in question is sugar or some hydrocarbon that may be easily converted into some of the different forms of sugar.

The conclusion then must be that, if in the operation of filling the few remaining bacteria are inclosed in such a manner that their natural food supply cannot be obtained, as soon as the sugar that may be inclosed with them is consumed no more acid can be produced and no more harm done. So if no harmful results can be expected when a little partially decalcified dentin is left as a natural covering for a nearly exposed pulp, it can hardly be judged as malpractice to leave it.

As to the question: What change, if any, takes place in this softened dentin? the answer is not so clear in my mind. The writer of the article referred to claims that such dentin is dead and that there is no calcification under fillings; in fact, his claim is that there is no change in dentin after lime salts are first deposited in the basis material or matrix. To prove his position he quotes Dr. Sudduth in "American System of Dentistry" as follows: "Dentin is a secretion of lime salts under the superintendency of the odontoblasts not around themselves, but around their fibrils. The thickening of the dentin is by accretion of lime salts in such a

manner as to lengthen the tubule. The fibrils lengthen as the dentin thickens, and the odontoblasts recede before the forming dentin." Dr. Sudduth does not say that after the histological formation of the tooth is completed in this manner no further addition of lime salts occurs, or that the dentin does not become harder with increased age of tooth.

Dr. Black says: "In the growth of dentin there is a stratum constantly presented that has not acquired its full amount of lime salts and is still comparatively soft. In the preparation of developing teeth I have often cut quite a little thickness off this," clearly teaching that hardening goes on after permanent shape is given the tooth by first deposit of lime.

Dr. Truman in "American System of Dentistry" says: "The change in color of teeth comes through increased density. In the early periods of development the basis-substance possesses a minimum amount of lime salts, and it requires a period sometimes covering a lifetime of teeth to reach complete development in this direction. A tooth can never be said to be fully formed from the time in which the outer shell of dentin presents on the pulp to the last hour of its use in the function of mastication in the living animal."

If it be true—and we are in good company in believing that dentin continues to harden after it is seemingly fully formed—is it too much to expect that under the slight irritating influence of a filling a mild continued active hyperemia will be set up in the dental pulp, resulting in a renewal of activity of the formative functions of the odontoblasts and a recalcification of partially decalcified dentin?

PRESIDENT'S ADDRESS.

BY H. J. COLE, D. D. S., NORFOLK, NEB. READ BEFORE THE NEBRASKA STATE DENTAL SOCIETY, AT LINCOLN, MAY 19-21, 1903.

"There are men and classes of men that stand above the common herd; the soldier, the sailor, and the shepherd not infrequently; the artist rarely, rarer still the clergyman, the physician almost as a rule. He is the flower of our civilization, and when that stage of man is done with, and only remembered to be marveled at in history, he will be thought to have shared as little as any in the

defects of the period, and most notably exhibited the virtues of the race. Generosity he has, such as is possible to those who practice an art, never to those who drive a trade; discretion tested by a hundred secrets; tact tried in a thousand embarrassments; and what are more important, Herculean cheerfulness and courage. So it is that he brings light and cheer into the sick-room, and often enough, though not as often as he would like, brings healing."

Such is the description of the physician by Robert Louis Stevenson, and it is the best characterization I have ever read, and as ours is a branch of that great healing art I have thought, although idealistic, that it is a standard worthy of our best endeavor to attain. A friend who had spent some time in Europe told me that members of our profession on the continent were such broad-minded, cultured gentlemen that they did more to stamp our principles of government and civilization upon the people of those countries than any other class of foreigners.

Our laudable ambition should ever be upward and forward. Growth is the word. We cannot become great or attain distinction by merely wishing it; neither can we become famous at a bound; were it so nearly all would take the leap. Whatever we are or shall be as men in our different communities is or will be gained only by daily striving for it. Nearly everything our current literature contains is how to do things, and the burden of all the lectures in our colleges is preparation of cavities, manipulation of filling materials, construction of artificial dentures, building bridges, correcting irregularities, etc. This is all well and good, for that is the principal object of the student's attendance, but certainly more attention should be given to correcting lapses from virtue, to preparation for living, to bridging abysses in the imperfect characters of so many of the great student body that is knocking for admission at the door of our profession, and to the construction of something that will abide when all else fails—an honest and upright character. When more attention is given to the character of the would-be student before he is allowed to matriculate, when the management of our great institutions is more careful in the selection of the teaching force (because a pure stream cannot flow from an impure fountain), then and not till then will the men coming into our profession be of the high standard for which we are pleading.

The dentist's personality. We note again the readiness with which the dentist impresses his personality not only upon the community in which he lives, the society in which he moves, but also upon his work. Show me the man who is careless about his financial obligations, slovenly about his person or surroundings, and I will show you one who will construct an ill-fitting and ill-finished bridge, or fill a pulpless tooth without attempting to fill the pulp canal.

The dentist should read good literature. Again, he should be a reader of good literature, that he may become familiar with the records and doings of the men and women of the past who have had to do with shaping the policy and life of the world, not only that he may be able to talk intelligently upon those subjects, but that he may be able to incorporate into the warp and woof of his being some of their life and energy. In no other way is it possible to become broad-minded and attain that degree of culture which the public have a right to and should exact from us. Also, he should be conscientious in all he does, giving the very best service in all he undertakes; if he does he is a real "angel of mercy," because in no calling is there greater opportunity for rendering real service to fellow-man than in our own. That is the chief aim of all true men and women. The highest type of manhood the world has ever known was one of service. That is life itself.

The dentist must be social. He must of necessity, also, be a social being. Every one needs some relaxation after the racking brain and muscular work of each day. I do not mean when I recommend society that we as professional men shall follow all the frivolities of fashionable life—we cannot afford the time or expenditure necessary to meet such demands, but I mean the society of good, sensible people, who recognize the fact that night was made for sleep. This class is the thinking class, the reading class, the intelligent class, that make men sound, sweet and strong. These are the people who move the world and hold it in equilibrum. This circle comprises the busy people who are working in the churches in reforms of all kinds, in the sciences and arts and the broad fields of literature and education. They are the people who are living to some purpose, and in this class I recommend you to find your friends. Is it asking too much to say that the dentist should be truthful? Certainly not, because these other qualifications that I have just mentioned are utterly impossible unless he has this also.

Dr. Holmes said, "Sin has many tools, but a lie is a handle that fits them all." Aside from its moral effect truth pays in dollars and cents.

Advice to young men. To young men just entering the profession I would impress this additional qualification upon your minds, that under no circumstances should any one be mean and stingy, but you should by frugal and industrious habits lay in store for your own and family's needs when your hands can no longer provide. You should at the very beginning of your professional career, or at least as soon as you can earn twenty dollars, open a bank account, and have great care at all times that that account is not overdrawn. Live within your income and conduct the business affairs of your practice in such a manner that from the beginning you will have established a creditable financial standing in your community.

In conclusion, the dentist should be pure in thought and in deed, so that he is able to stand the test, and after having passed through the fiery furnace of public opinion there will not even be the smell of fire upon his garments. These qualifications of manhood that I have referred to so briefly are, it seems to me, some of the more important ones that every dentist should possess if he expects to measure near the standard of the characterization which Stevenson ascribes to the physician.

Give us men!
Strong and stalwart ones;
Men whom highest hope inspires,
Men whom purest honor fires,
Men who trample self beneath them,
Men who make their country wreath them
As his noble sons,
Worthy of their sires;
Men who never shame their mothers,
Men who never fail their brothers,
True, however false are others.
Give us men, I say again,
Give us men!

ORTHODONTIA.

BY EDWARD H. ANGLE, D.D.S., ST. LOUIS. READ BEFORE THE PENNSYLVANIA STATE DENTAL SOCIETY, AT WILKESBARRE, JULY 7-9, 1903.

To my mind orthodontia has a far brighter future than any other branch of dentistry, but I do not think there is any other department of our profession that is so poorly handled by the average practitioner. I do not believe four per cent of the dental profession to-day know the proper occlusion of teeth. Many men work at orthodontia without literature or appliances, which is absurd, as it must be studied broadly and earnestly. It is a most difficult branch and should be treated only by a specialist. I know that students are taught in the colleges to practice it, but they are taught many absurd things about it, and they should not continue it unless they have great mechanical ability. If you find you are not qualified to undertake this line of work, that you are not interested, and if you are not willing to study and master it, I want at least to awaken within you a realization of the danger of superficial study and practice of this branch.

The first molar is the most important tooth as regards orthodontia. If it does not erupt normally all of the other teeth will be irregular, and it also regulates the bite. We should begin to study all cases of malocclusion by the position of this tooth. Remember that the lower arch is the most important at every stage of the work. Early attention is most important, as each day's delay makes matters worse for the patient. All cases should be carefully examined five or six years after the correction. Do not think you can keep one arch correct in size and the other incorrect. Everywhere in dental literature it is stated that if the child inherits large teeth with a small jaw there can be no harmony and we must extract. I do not believe this, as I think there is room in the mouth for all the teeth that nature intended us to have. I used to believe in extracting but I do not any more. I think as Herbert Spencer does, "That a man has a right to change his views every twenty-four hours as long as he succeeds." The Creator knew best how many teeth we should have, and we cannot consider ourselves scientific men if we sacrifice these organs. When teeth are so decayed that they must be extracted it is our duty to replace them. Some writers claim that irregularities of the teeth are found only in the mouths of the degenerate, but I think they are accidents in the eruption.

To my mind good models are most important, and it is not possible to make them with any impression material that is of a waxy nature. They should be of plaster and represent as much of the jaw as possible. Should show the muscles, position of the roots, etc., and should be made with as much care as though they were for crown or bridgework or a denture. We should be able to study each occlusal plane. I compare the model each day with the patient's mouth to see that all is going well.

Literature is overburdened with appliances, but far more important are the principles governing their use. I have brought out many appliances and formerly used a large number, thinking them necessary, but now I employ only a few. I have discarded the jack-screw and chin-cap almost entirely. The appliance I am now using is the one with cemented bands and ligatures, and is fashioned after a very old one, some improvements being made of course.

Discussion. *Dr. H. M. Beck,* Wilkesbarre: The younger men have been brought up to look upon irregularities as the bugbear of dentistry, and until the last few years they were advised to undertake no case of malocclusion for the following reasons—First, because more than ordinary mechanical skill and ability is necessary. Second, because during the period the appliances are in the mouth the patients are often very difficult to manage. Third, when the desired result is accomplished the remuneration is entirely inadequate for the service rendered. It seems to me that it is time to bury these old fogy ideas. I would earnestly advise every practitioner of dentistry to take up malocclusion as he would any other branch of his profession, and if good judgment and a little common sense are used in the management of the case and the patient it will not be long before the dental profession will look upon these disorders in a very different light. The public in general is beginning to realize that malocclusions are deformities which can and should be corrected. Parents are willing to pay the dentist a larger fee for this service than he could possibly obtain for any other operation, and the practitioner who permits his patients to go through life with these disfigurements is certainly not giving them the attention they are willing to pay for and should receive.

Dr. James Truman, Philadelphia: There seems to be an objection to one point at least in Dr. Angle's method—if a cuspid is out of position and articulation is normal he carries back all the teeth or

spreads the jaw. It seems to me that if he spreads the jaw he must produce an abnormal facial condition, and if he carries all of the teeth back he makes the operation so severe that he might better extract the first bicuspid. The importance of restoring the face and mouth to their normal condition should elevate mechanical dentistry. Dr. Angle's method is both scientific and mechanical. I desire to see the scientific and mechanical features equally elevated, and it is through such work that dentistry will be made equal if not superior to medicine.

Dr. S. H. Guilford, Philadelphia: Dr. Angle and I do not agree on some points, but we do agree that the study of orthodontia is so important and interesting that one can readily become infatuated with it. This is because it brings principles into play, and takes into consideration the histology and pathology of the tissues as well as the anatomy and physiology of the part operated upon. It is a subject that should be relegated to the specialist, and I believe the majority of practitioners would rather turn these cases over to one who is more familiar with this line of work. Orthodontia is without doubt a recognized specialty of dental practice, but it is a branch which requires great mechanical ability, experience and judgment.

Dr. Angle, closing discussion: I do not agree with Dr. Beck that any young man can do this work, for I have been communicating with thousands of students who have no more talent for it than they have for playing a musical instrument. The argument that it does not pay is absurd, for if you are skilled you are paid for that skill. There is an immense field for orthodontia, as the streets are swarming with specimens of malocclusion. Plenty of people would be glad to pay well to have the irregularity in their mouth corrected, but they do not know where to go, as orthodontia has always been made a side issue in dentistry. A practitioner who becomes skilled in orthodontia work will be better paid for his efforts than the man who fills teeth.

PRESIDENT'S ADDRESS.

BY J. S. CASSIDY, D.D.S., COVINGTON, KY. READ BEFORE THE KENTUCKY STATE DENTAL ASSOCIATION, AT BOWLING GREEN, MAY 25-27, 1903.

Since our last meeting the immortal part of one of our oldest and most respected members, Dr. A. Wilkes Smith of Richmond, has

passed over to "the Land of the Leal." He never faltered in his enthusiastic endeavors to place Kentucky dentistry in a position second to none among its kindred of other states. He cultivated zeal and courage, governed by judgment, and although naturally gifted with varied talents and a pleasing personality, a man of affairs in his own community and elsewhere, it was the fact of his being a devoted member of this society upon which he always wished his fame to rest. It is meet and proper that we thus pay sincere tribute to the memory of Dr. Smith, and extend our fraternal, personal and official sympathies to his afflicted family, but while we cherish the memories of the departed, we should strive always to cultivate the friendliest feeling for those who are still with us, working as best they can until their time too shall come.

In these enlightened days the educated man no longer imagines that his road to success is lined with the imperative warning to his competitor—"Get out of the way or I'll run over you." He no longer construes "the struggle for existence and the survival of the fittest" to mean the cruel use of the war club and the battleax of stone against his self-supposed professional enemy. The vile tongue of slander, the brutal word of unmanly depreciation, he leaves to the degenerate whose prejudiced eyes discover unmistakable evidence of carelessness from the hands of his hated rival in the mouths of gossiping patients, and whose hope of gain from the public is by traducing and vilifying those whom he foolishly considers as impediments to his success. There is enough to do for all, and men of properly balanced minds recognize the rights of the public to patronize whom it pleases. These remarks may not apply to members of this association. They are intended only to encourage in a general way among us here and at our homes the gentler qualities of this strenuous life, and to discourage the kind of ethics presented by that typical trader and banker of western New York—"Do to the other fellow what he would like to do to you, and do it first."

The question naturally arises, what do you regard as a successful lifetime career? Correct answers to this may be various, according to the circumstances and the salient points from which the observers may derive their several opinions. The one who considers himself the happiest man in the world is so undoubtedly, and this is the only instance of self-assertive egotism that is not resented by the rest of mankind. Perhaps, however, the majority of people do not look

upon the possession of personal happiness in another as equivalent to personal success. They somehow feel that monetary independence is the *sine qua non,* and inasmuch as different states of vibratory excitation are the cause and concomitant of all natural phenomena, the vibrations in some portion of the brain corresponding to a knowledge of a reasonable competency are possibly a desideratum more important than any other one factor in the premises, and these combining with the more or less rapid modes of motion in other parts involved in other possible essentials produce the necessary conditions, like mixing different pigments so as to obtain the desired color.

A well-known attorney of a neighboring city, in talking to a friend, defined the successful citizen as one who is held in high esteem by his business or professional associates, and with few exceptions, just enough to prove the rule—is looked upon by them with more than ordinary respect and affection. If this be one of the true definitions of success, and I have no doubt it is, then a kindly consideration for the rights and privileges of others as in every way equal to your own must be the lever that can raise one to such an enviable position.

As bearing somewhat on this question of success, let me allude to one phase of dental literature found in our journals during the last few years, namely, "the etiology of dental caries." Drs. Miller, Black, Magitot, Underwood, Kirk, Williams and others are given their legitimate places among the undisputed authorities on the subject, but I fail to find the name of Dr. George Watt of Ohio included in this list.

A single word spoken in the philosophic sense may convey to the thoughtful mind a conception or a meaning as extensive as the universe itself. That one word may be *confidence,* without which business enterprise could not be conducted, family ties could not exist and even our worship of the Infinite One would be null and void. Or that word may be *nascent,* applied not alone to the time "when the morning stars sang together" but participating now and then in every chemical evolution. That word nascent, its meaning well known before, was used by Dr. Watt to my own knowledge at least as early as 1867, in a lecture on the presumed cause of true dental caries. In that lecture he brushed aside the idea that a general acid condition of the saliva was the cause of this disease. He stated that the active cause of caries was due to the breaking up of highly complex organic bodies, food debris, etc., into simpler forms, which process

frequently resulted in the formation of destructive acids, and these latter agents, at the point and instant of their development, i. e., in their nascent state in contact with the tooth substance, effected solution of continuity in the part to the extent of their mutual affinity. This statement furnished the key to our understanding and subsequent free acceptance and appreciation of Miller's great discovery, just as truly as the theorem of Archimedes afforded the key to the general doctrine of the equilibrium of floating bodies.

Facts are not always true. Truth is eternal. A fact to-day may not be a fact to-morrow. There was a time when it was supposed that the surface of the earth was a flat plane, and therefore it was a syllogistic fact that two plumb lines suspended any distance apart would be parallel, a proposition that we cannot now accept as true.

Dr. Watt at first opposed the "germ theory" with reference to caries, because of the fact that at that time we conceived bacteria to be closely related to little worms and bugs, and that the solvent oozed, or as the doctor would express it, was propelled by them onto the defenseless tooth, in a manner similar to the propulsion of the active principle from the body of the skunk.

A paper read at a meeting of this society in the early eighties endeavored to prove that with the correct appreciation of the so-called two theories, the "germ" and the "chemical," there would be no conflict between them, inasmuch as the process of fermentation induced by microorganisms produces the nascent acid molecule, and the changes involved are of necessity purely chemical. In a letter to the writer Dr. Watt fully endorsed the sentiments of the paper, and modestly claimed a share in the credit due to one who in the beginning aided in the elucidation of the truth. For these and many other reasons that could be cited I insist, in justice to all concerned, that the name of Dr. George Watt should not be either thoughtlessly or wilfully ignored by writers and speakers on the history of the etiology of dental caries.

Among the many matters of interest that have engaged the attention of the profession during the past year is the inconvenient absence of uniformity in the dental laws of the several states. Some day judicious legislation will rectify the present difficulties, and meantime would it not be a graceful action for the examining boards of adjoining states to adopt a rule by which their certificates would be mutually recognized? Why should not Kentucky take the initial

step in the direction of this brotherly reciprocity? The indications now are that in all human affairs, private and public, the twentieth century will see in letter and spirit the rule of reciprocity an accomplished fact. Reciprocity, equalization, is the law of nature, animate and inanimate. It is, indeed, this idea that has brought porcelain inlays into use, to equalize the modes of motion of their particles and those of the substance they are intended to protect; and the only philosophical difference in the analogy between the practical use of porcelain inlays, and reciprocal action of the state boards of dental examiners, is that the first has come to stay and the appearance of the other is but a question of time.

PORCELAIN INLAY CEMENT SHADE GUIDE.

BY CHARLES M. BALDWIN, D.D.S., CHICAGO.

The color of the cement used for setting porcelain inlays in shallow labial cavities may cause a great change in the appearance of the inlays, as may be the case when filling a cavity due to several pits in the incisal third of the central incisors. With the matrix removed the inlay is placed in the cavity and found to be an excellent match, requiring close observation to see that any repair has been made, but after cementing it in the cavity it seems to have undergone some remarkable change, as a yellow or green shade shows through where there was only a light pearl gray before, or it may have become considerably lighter or darker.

A decided change in the appearance in this class of inlays may be caused by allowing some physical property of the cement to make you forget to give attention to its color. It is not safe to select the color by the label on the powder bottle, as the label may be wrong, and colors of the same name may vary, especially if made by different manufacturers. The only way to know the color of a cement is to see it after it is mixed and set and before the color fades.

To make a cement shade guide. On a stiff white card make a list of the cements you use for setting such inlays, putting down the maker's name and the colors. Number the list, cork and labels of the powder bottles to correspond with each other. Mix liquid and powder from each color in the same proportions as for setting an inlay, and stick each sample opposite its number or name on the list. Such a guide will readily show your variety of colors and shades and will perhaps indicate the need of more powders. Colors can be

altered by mixing two or more powders of different shades before adding the liquid.

The judicious choice of the color of the cement used will help correct the shade of labial inlays that may be a little off color, and will not alter the appearance of the inlay that is satisfactory before being cemented to place, except as all cements change the rays of light.

Cement guides should be kept clean, free from dust and finger-stains, and should be replaced or fresh samples of cement should be mixed and placed on the same list when the old ones become soiled or the colors so faded as to be unreliable. There is a great difference in the extent to which the different makes and colors of cements fade, for while some remain almost unchanged others fade very perceptibly. Experiments should be conducted along this line and results noted, if we want our inlays to match the teeth as well in a few months as when inserted.

ECHAFOLTA.—This drug is a corrective of blood dyscrasia. It exhibits marked anodyne properties, and in septic ulceration and abscesses its action is specific. In cases of necrosis after extraction, remove all necrosed tissue and cleanse the area with warm water and apply locally with syringe three times a day, "echafolta two drams, distilled water three ounces." Internally, a teaspoonful every hour for several days of "echafolta two drams in four ounces distilled water."—B. F. THIELEN, *Tex. Dent. Jour.*

MISFIT RUBBER PLATES.—When the bite and articulation in the old plate are correct, cut undercuts from the plate and fit it as close as possible to a new model, wax to form, and flask. Boil out wax to separate. To soften old rubber, boil the half of the flask that has the teeth and old plate in glycerin; remove the old plate. Any rubber remaining can be removed in the same way. Replace the teeth in position, pack, vulcanize, and finish as usual. This method saves time in many cases of making over plates. Where the articulation is wrong in the old plate this method cannot be used. No wax is needed on the palatine surface of most old plates to make the new one thick enough.—*Brief.*

DISLODGING MATRIX FROM CAVITY.—If all directions have been followed and no undercuts left in the cavity, the matrix can easily be dislodged by the aid of a thin, flat instrument passed under one of the corners. Another way to remove it is with yellow wax, pressing it into the cavity with the ball of the finger; and when the finger is removed the matrix will be found clinging tightly to the wax and the wax to the finger. The wax can be removed by dipping it in boiling water or holding it a few minutes in a Bunsen or alcohol flame. Great care should be taken to see that the matrix is perfectly clean, as any carbon remaining from the burnt wax will discolor the porcelain.—T. P. HINMAN, *Headlight.*

Digests.

DENTORED DENTURES. By W. Storer How, D.D.S., Philadelphia. At the last meeting of the National Dental Association Dr. N. C. Leonard of Nashville read a paper on "Adhesion vs. Atmospheric Pressure in the Retention of Dentures." [Dr. Leonard's paper appears on Page 267 of this issue of the DIGEST.—Ed.]

Dr. Leonard sought to distinguish between denture retention due to the capillary attraction induced by the film of fluid between the mucous membrane and the base plate or denture, and retention due to partial air exclusion and consequent pressure of the atmosphere on the plate or denture, especially when vacuum chambers are employed. Hydrostatic and pneumatic principles in their several and joint relations to the subject were set forth by the author, and cited in more or less detail by the several participants in the ensuing discussion, which, in the main, might be deemed contrary to Dr. Leonard's contention that to hydrostatic pressure is in great part due the denture adhesion usually ascribed wholly to atmospheric pressure.

The lack of a convenient blackboard discouraged the "chalk-talk" considerations at that time in the mind of the present writer, who now recurs to his article in the *Cosmos* for July, 1895, and briefly cited in the "American Text-Book of Prosthetic Dentistry" at pages 582-3, as suggestive of a further elucidation of Dr. Leonard's subject.

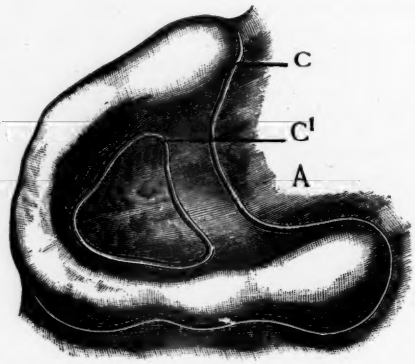
The following premises are pertinent at the outset: In the oral region of the patient with which we are concerned we have as a base of operation the completely or partially edentulous hard and rigid upper or lower jaw bone. Each has a superposed cloak of smooth, soft vascular tissue constantly covered with mucus, a viscid fluid which gives rise to the designating term "mucous membrane." The problem is to make a hard and rigid base plate closely conform to the moist, soft, smooth, irregular surface of that living, sensitive mucous membrane, and carry securely for purposes of mastication and speech an artificial denture. The proceedings in the production of a denture for a given case will be modified by its peculiar requirements and the competency of the dentist. All will depend upon the close contact of the plate with the mucous membrane which it covers, and for present purposes attention will be restricted to base-plate

contact and detention, without specific reference to the superposed denture.

Fig. 1 represents at A a plaster model of an edentulous upper jaw to which a vulcanite, celluloid or cast-metal plate is to be conformed. With a spoon excavator, say No. 186, and following a carefully penciled line along the buccal and labial borders of the muscle attachments, a shallow groove or channel (C, Fig. 1) is smoothly cut and continued across the palatal arch as shown, the outline being uninterrupted. A supplemental channel (C^1) may then be likewise cut.

A resultant denture and plate (B), with the raised half-round dentors D, D^1, would appear as in Fig. 2. In Fig. 3 a partial plate and denture are shown as made in like manner, but the illustration

FIG. 1.



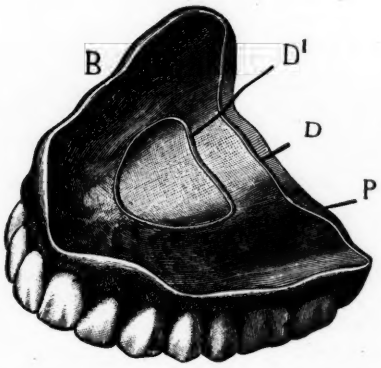
will also represent a struck gold plate on which, after a perfect annealed adaptation, a link of No. 22 platinum wire, as D^2, is soldered to the plate. The denture B, Fig. 2, may also be viewed as consisting of a wire-dentored metal plate on which gum-section teeth are mounted in vulcanite. A set of plain teeth with pink vulcanite gum mounting on such a gold plate would likewise resemble the denture B, Fig. 2.

These illustrations and brief descriptions prepare the way for the further consideration of the principles and practicalities involved in this species of prosthetic products. Whether the denture has a vulcanite, celluloid, cast-metal, or struck-metal base plate, the conditions under immediate contemplation are—(1) An edentulous human upper or lower jaw. (2) A partially edentulous upper or lower jaw.

(3) Its soft smooth mucous membrane. (4) The viscid mucus (*and saliva*) *covering its membrane.* (5) *A rigid artificial plate* closely conformed to a regional portion of that mucus-moistened membrane.

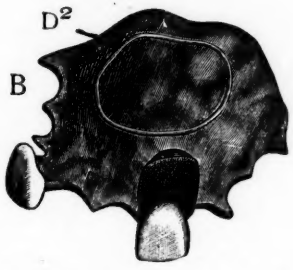
(6) In any given case it is understood that the smooth plate at

FIG. 2.



rest in position on the upper or lower jaw is in accurate coaptive conformation to the included surface of the mucous membrane. Fig. 4 represents in medial vertical section, magnified, the oral region of an edentulous upper jaw (UJ), its rugæ (R), mucous membrane (M),

FIG. 3.



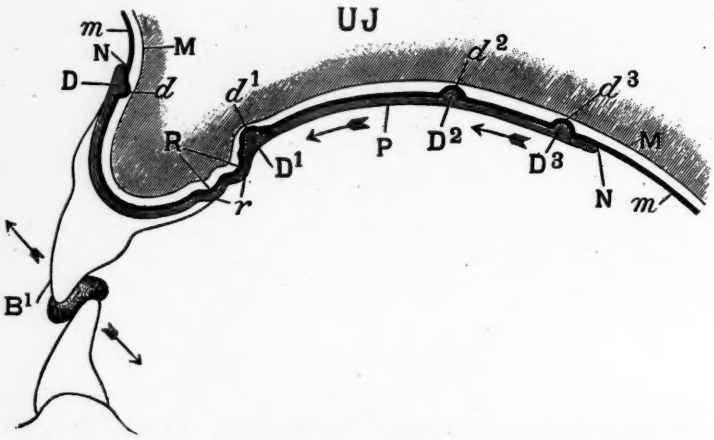
mucus film (*m*), and the dentees (*d*, d^1, d^2, d^3) made in the membrane by the dentors (D, D^1, D^2, D^3) of the plate P. In all the following descriptive matter the plate will be designated by the letter P, and the denture of whatever superposed sort by the letter B. The new term *dentor* describes a complete or partial low-relief in-

closure formed or fixed on the contact surface of a denture plate, and to the corresponding depression made by the dentor in the mucous membrane is given the new term *dentee*. When the denture Fig. 2 is in position and pushed into place by occlusion or otherwise, exhaustion of air from the oral cavity by the act of swallowing will develop—

(7) Atmospheric pressure (a. p.) on the exposed surface of the denture plates B, P, Figs. 2 and 4, consequently the denture will be maintained at rest in resistance to gravitation.

(8) When by incisive action of the lower denture (see Fig. 4) an outward and upward pressure in the direction of the upper arrow

FIG. 4.



ensues, the resultant stress tends to detach the plate by starting it from its palatal border (N), which has an extent approximately indicated by the transverse vertical section view, Fig. 5, from N to N.

(9) The mucus (*m*, Figs. 4 and 5) is a *viscous* fluid, exerting a considerable amount of seated superficial *energy* in contact with the membrane (M) and the plate (P).

(10) Hence the *flow* of that film of energized viscous mucus between M and P in resistance to air inflow at N will be slow; and then, besides, there is—(11) The *friction* of the mucus flow to be overcome.

(12) Moreover, the restriction of flow and friction by mucous membrane condensation between the dentor D^3 and the dentee

d^2, is a detentive factor additional to the retentive factors (9), (10), and (11). A philosophical disquisition on the physical principles and functions here involved would be appropriate, but the present purpose is simply to direct attention to the actual conditions to be met in practice, and to provide practical means for success in meet-

FIG. 5.

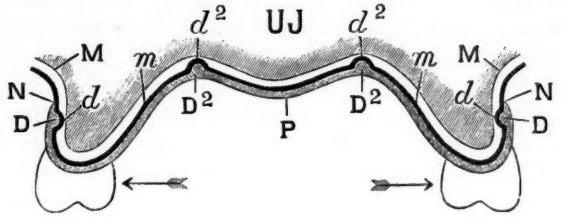
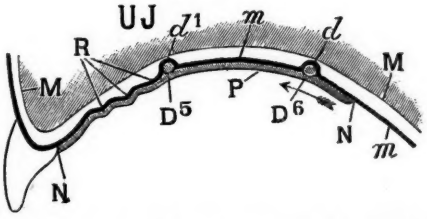


FIG. 6.

FIG. 7.

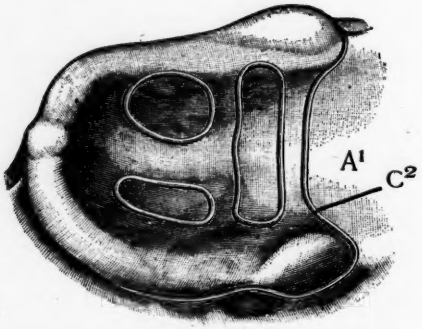


ing and overcoming them. It is thus made obvious that resistance to the detaching stress of (8) is active in the leverage exerted by (7) at the transverse palatal curved border N of P, Fig. 4, as opposed to the one-fourth less leverage of the push at B^1, where, at the same disadvantage, the energy (9), flow (10), and friction (11) of the mucus *m* is to be vanquished at N *after* (7) has been neutral-

ized so far as to let a. p. (7) begin to drive *m* under N against D^3, d^3 (12).

(13) The time element then becomes a detentive factor additional to viscosity, energy, flow, friction, and dentor-dentecsion, as *m* is pushed by air-film pressure in the direction of the arrows against, over, and past D^3, d^3, D^1, and R, *r*, until at D, *d*, the plate and denture become finally detached. We see, therefore, that in addition to atmospheric pressure (7) we have the inherent, coherent, adherent, attractive, resistive, and detentive potencies of (9), (10), (11), (12), and (13), to be made cooperative in a resultant leverage-resistance to denture displacement. The behavior of the enumerated factors is furthermore made manifest by observations on Fig. 5. Lateral masticatory action in the direction of either arrow should fail

FIG. 8.



to detach the denture for the reasons previously set forth. Jaw-separative action, following occlusive contact with a caramel, for example, should also fail to pull down the denture because of the auxiliary detentiveness of D, *d*, Figs. 4 and 5.

Lower-jaw dentures, complete or partial, are subject to the like conditions and correlations as are dentures of the upper jaw, but in less degree, under more difficult, delicate, and modifying requirements, as having narrower, less crested bases, and thinner mucous membrane; being subject to constant gravitational pressure, and also dilutions of the mucus by the abundant, less viscid, saliva. Fig. 6 is a transverse vertical section across the second molar region of a lower full denture.

(14) In this instance masticatory lateral stress in the direction of

either arrow would be counteracted by the gravity of the denture pressing against the upward slope of the jaw, and the consequent (8), (9), (10), and (11) factors, reinforced by D, *d*, and D', *d'*, on the opposite body of the jaw; the resultant resistance to displacement being (7), (14) plus (8), (9), (10), (11), (12), plus—(15) the upward masticatory force.

In the construction of complete lower dentures it is of importance to provide for such incisive occlusion with the upper denture that the contactive stress on the lower incisors shall be downward and backward (see lower arrow, Fig. 4), with a resultant reversal of the effects observed with reference to the upper denture of Fig. 4; the leverage in the molar region of the lower plate P^2, Fig. 6, tending to its detention instead of its displacement.

Fig. 7 is presented to exemplify the corresponding or correlated behavior of a wire-dentored struck-metal partial plate similar in appearance to the denture represented in Fig. 3.

FIG. 9.

The extent, inclusion, height, and outline of either the channeled or wire-formed dentor-adjunct in any presenting case is subject to the judgment, experience, and skill of the dentist in charge, some suggestive shapes being shown in Fig. 8.

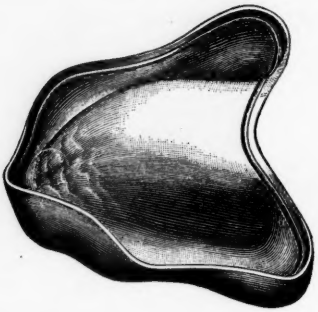
When at any point the dentor is too high, producing irritation of the denteed membrane, or, in protruberant jaws, preventing the placing of the denture in position, the crest of the dentor may be ground off with stump wheel and polished as at *c*, Fig. 9, the dotted lines indicating the correct rounded solder junction of the dentor with the plate.

When, as in Fig. 8, the channel C^2 will form a dentor that nearly outlines the plate surface, a vault dentor will seldom be requisite (see Fig. 10), since the sustaining stress is thus located at the most effective peripheral region for denture detention; while the long leverage of the palatal dentor extension is eminently efficient in resistance to the biting action which is the foremost factor in the actual detachment of the denture. The forward force for fracturing the film and prying off the plate at this transverse border against

the there most-potent air pressure meets its match whenever the correct constructive conditions and contrivances have been skilfully materialized in the denture. Among the excellent practical results of adopting the dentor feature should be the absence of that hump over the old common vacuum chamber which so often nearly obliterates the anterior arch of the vault, mumbles the speech, and issues a warning whistle at the utterance of nearly every train of thought, whereas the dentored denture permits the vault region of the plate to be made suitably thin for rugæ representation, thus providing for correct vocalization and free tongue movements consonant with the highest and most practical type of dental prosthetic production.

Several of the figures will serve to illustrate the correlative scheme of denteed dentures. For instance, a struck-metal plate, while still

FIG. 10.



in the counter-die, may with a suitable tool have a continuous groove formed by repoussé work along the course of the wire dentor shown in Fig. 10. In that event the initial retention of the denture will be by a. p., but the plate dentee will soon be filled by an M dentor, and the improved detention ensue. A vulcanite, celluloid, or cast-metal upper or lower denture may likewise be improved by forming continuous or interrupted dentees in suitable locations by means of a proper sized round bur, followed by a smoothing and polishing point.

A wire-dentored continuous-gum substitute may be deemed the denture *par excellence,* but a perfectly-fitting gold plate, wire-dentored, as shown by Fig. 10, and rimmed, roughened, or looped for vulcanite retention, with a series of single gum teeth artistically arranged, united in an electric furnace, and mounted with dense

vulcanite to produce a denture similar in appearance to Fig. 2, would constitute an achievement in practical dentistry worthy of the professional proficient who honors the alma mater which he represents by the entitled suffix, D.D.S.—*Cosmos.*

PREVENTIVE DENTISTRY. By L. C. Bryan, D.D.S., Basle, Switzerland. Read before the American Dental Society of Europe, Madrid, 1903. We look in vain through the medical and dental records of the past for any systematic method employed by the professional dentist or medical man to prevent decay of the teeth. This important branch of our labors—prophylaxis—we have delegated to our patients until a very recent date. We have condescended as professional men to do a certain part of this work in removing calculus—prescribing washes and powders and selecting or approving certain forms of brushes and other toilet articles to be used by the patient, but this has been an understood departure from our higher office of devoting all our energies to the repair of decay when it came, and the subject of prevention has received a minimum of our time and thought. Our research in the fields of chemistry, bacteriology, therapeutics and allied sciences has been directed to the arrest of decay or searching for means to be applied systemically for building up more resistant tooth structure, and so far as I know no one has applied remedies externally in a successful manner to sound teeth and to those parts of these teeth where we know from clinical experience we can expect decay to occur with mathematical certainty under given conditions. Even the elements for tooth building which are recommended by some eminent authors to be supplied systemically are cried down by equally able and scientific investigators as utterly useless.

I have struggled along a quarter of a century repairing the ravages of decay when, like the rest of you, I had the specific for the evil corked up and labeled *remedy,* whereas it should have been labeled in flaming colors *preventive.* It is a bottle which in the past I have looked on as a sort of Pandora's Box, the cork of which I dreaded to remove. Now I find it to be one of the most powerful, reliable and harmless remedies in our special materia medica and use it freely daily. Nitrate of silver is now my main reliance for stopping and preventing decay, and has been for retarding since my college days, but it has been only about three years that I have used it on

sound teeth to make them immune from decay and to build up strong, hard tooth substance to resist the approach of decay.

You are all familiar with its effects on erosion, superficial decay and defects where softening of the tooth commences and the decay is not deep enough to require filling. The use of $AgNO_3$ under varying conditions has been recommended largely and most earnestly by American writers, commencing with Brooks in the year 1854, as quoted by Szabo in his most comprehensive resumé of the literature of nitrate of silver, from which I have drawn largely, and his valuable addition to the histological and clinical phases of its place in dentistry. Stebbins was my first inspirer in the use of $AgNO_3$, and since reading his article in which he described his treatment of school children's teeth, only in cavities and on defective surfaces, I have used it in increasing quantities and have finally come to look upon it as not only a valuable treatment for defects in the teeth but for stimulating new activity in the tooth-building cells.

Dr. Stebbins writes: "Some patients would object to having it applied to any tooth on account of the color, others would be pleased to have it used where the cavity would not be seen, but there are thousands who must have some such treatment or become edentulous. Children who are too timid to have teeth filled, or whose parents have not the means to pay for filling, must have some relief or suffer untold misery and lose their temporary teeth too soon, thereby involving themselves in lifelong troubles. Having witnessed the relief of so many children from constant agony, and their exemption from toothache for years by the application of this agent, it seems to me it is worthy a larger place in our practice."

Miller says: "If teeth with decay marks are left in hydrochloric acid till the enamel begins to dissolve away it will be found that these spots resist the action of the acid longer than the normal enamel." In a footnote he says: "If we could determine the nature of the process which takes place in the decay marks, we ought to be able to derive some suggestion from it which would be of value in the prophylactic treatment of the teeth as well as in dealing with caries." In a letter to me he questions my theory of the stimulation of the tooth-building and repairing cells and thinks I could get the same results in dead teeth as in living ones with the nitrate of silver. However, we know that these building cells of the teeth go on strengthening the teeth and depositing additional lime salts from fetal life

to old age. Half the writers who recommend nitrate of silver speak of the hardening of surfaces of teeth treated with it. We know that the commencement of decay produces an irritation and stimulation of the tooth-building functions of the pulp, that secondary dentin is thrown out and possibly enamel is made more resistant, which under favorable conditions stops the decay by building up a dense resisting wall in its track. My clinical experience has convinced me that this is accomplished by the peculiar action of the nitrate of silver on the deeper tissues and pulp in a much more effectual way, while the coagulating effect (on the albumen of the tubuli), producing albuminate of silver and various other combinations, according to Prof. Chas. Moyr, in the outer ends of those tubuli, allows the fortifying process of the pulp to go on under protection from the outer impenetrable coating deposited in the softened dentin. This is a theory of mine which is not accepted as yet by those histologists who have made a life study of the subject, which I have not, and until I have proved it microscopically I throw it out only as a suggestion and a theory and ask the investigation of it by those more capable than I to prove or disprove it. The clinical results convince me of its correctness for the present.

Szabo writes: "For the purpose of stopping this carious process one desires to make the softened dentin hard (?), and for this purpose one uses the nitrate of silver in the form of a pencil or powder, etc."—(Notice the question mark.) He evidently does not believe in the theory of a deposit of a harder dental substance through the action of $AgNO_3$.

Miller quotes Stebbins and gives his results with 35 schoolchildren where he treated 64 cavities, and after one year found in 37 cases no progress of the decay, while fourteen cases showed traces of progress, and in 13 cases no lasting results were observable from the treatment and decay had recommenced after a year. It seems to me as if these statistics would have been more valuable if the treatment had been repeated in four or six months and continued for some years, as I propose to do with my 100 cases, where I shall saturate all the teeth, new and old, semi-annually, from incisors to molars—in the hope of *preventing* caries—and thus treat all newly erupting teeth prophylactically, nipping the evil in the bud.

The literature of nitrate of silver is rich and well worthy of study, but nowhere have I found a writer who advocates more than touch-

ing danger points or using it as a remedy for existing evil, and I feel justified in emphasizing its importance as proved in my hands as a preventive of decay and a stimulant (of which I am clinically convinced, but which still remains to be proved microscopically) of the odontoblasts to build up secondary dentin and to deposit lime salts in weak parts of defective teeth and strengthen sound teeth, at the same time that it deposits an antiseptic layer or coating of silver salts on the surfaces of the teeth and coagulates the albumen in the tubuli to a certain depth (½ to 1 mm. in softened dentin and infinitely less on hard surfaces), thus limiting its penetrative power by making an impassable and insoluble barrier where it is most needed. Its effects on diseased gums are something marvelous, and it is a well-known remedy in pyorrhea alveolitis and many of the ills of the mucous membrane in the oral cavity and elsewhere. Bouchacourt recommended it in 1854 as a mouth wash against stomatitis.

We have, however, failed to appreciate its peculiar stimulating effect on sound dentin and those invisible defects in apparently sound teeth, where it will penetrate and deposit its salts in such a way as to prevent the penetration of bacteria into the tubuli, by destroying the food supply of the germs or converting it into indigestible material which will resist for a certain time the effects of fermentation and other processes of decay. Exactly what the time limit of this immunity is remains to be established under varying conditions, but it may be roughly stated that the mummifying (coagulating) effects remain for from some months to many years, depending on the situation and environment of the treated surface.

We need not further consider the well-known qualities of $AgNO_3$, but confine ourselves to considering results in a new field—the most important found yet—and this seems to be my contribution to the subject—the early treatment of teeth known to be of a weak texture by bathing them freely on all exposed surfaces on their first appearance through the gums and repeating this at intervals from four months to a year. It is a question if sound teeth need to be bathed with a forty per cent solution of $AgNO_3$ oftener than six months to a year, but my best results in unfavorable conditions and positions have been secured in varying periods of treatment, and I cannot say positively if it is necessary to apply it oftener than once a year, as the cases of superficial decay so treated have been quite as satisfactory as those treated more frequently.

I now purpose to take 100 new patients beween the ages of five and seven and treat one side of the mouth above and below without undertaking any filling of teeth. The other side will be left for comparison, and we shall in this way be able to make comparative tests of the method as a preventive. In my private practice I have naturally filled every cavity as soon as it could be filled, and when the history of the case and the family showed that I would have great difficulty in saving the teeth I have freely bathed the newly erupting teeth with 40 or 50 per cent nitrate of silver and then dried it off until only pure crystals were deposited over the surfaces of the teeth and in the invisible defects or commencements of decay. I commenced this in desperation two years ago in a case where for a healthy girl of eight of good family, well nourished, etc., I had put from six to ten fillings in the first permanent molars. The upper incisors showed softening and decay immediately after eruption, and these were bathed freely and kept dry under rubber until a quantity had been applied and dried in several times. The incisors were then brushed with pumice and found not to be discolored except upon softened places out of sight, and these places were removed partially when not too deep and retreated, and deeper defects left dark when out of view. The erupting bicuspids were also treated so. After two years of this treatment the defects in the incisors remained without further advance of decay in any part and looked stronger and denser than before. Two bicuspids (lower first) in this mouth illustrate the effects of nitrate of silver. The left one erupted some months before the patient came for usual treatment. When I saw her it was more than half erupted and the surface was already rough, softened and defective, and took on the peculiar dark stains when treated with nitrate of silver almost over its whole surface, while the other on the right side was just erupting, and the application of nitrate of silver left no stain, and no roughening or decay has since occurred on it.

As the lower incisors never decay till all the other teeth are either badly decayed and filled or lost entirely, I did not give them any treatment, and they not being subject to tartar at this age in a well kept mouth, I gave them no further thought until last winter, when I brushed them up with a wheel and found to my astonishment that they were decayed on all proximal surfaces except next to the cuspids, which were just erupting. I put in six fillings (proximal) in

these four lower incisors—something I have never been called on to do before and probably never will be again.

None of my dentist friends has ever had a case like this, and there are two gentlemen present who saw the case in my office. At her last semi-annual sitting there were no new cavities in any of the teeth and only two old amalgam fillings in temporary molars had to be renewed, as they had broken out. Within the last three years I have treated many, both old and young, with this bath of nitrate all over every tooth, and the benefits have been invariably immediately noticeable, and I feel perfectly confident now that I can take 100 children under the most unfavorable circumstances at the age of five, and by bathing all the teeth freely with nitrate immediately the permanent ones appear through the gums, taking half an hour thrice a year, I will bring the teeth with the worst pedigree up to the age of maturity without serious cavities or fillings! Having confined myself heretofore to a select practice with a limited number of young patients, I have been unable to make such tests as I shall in the next year with my 100 poor children, and I will thus be able to submit statistics which I hope for humanity's sake may show similar results on a large scale as I have seen in a limited number of cases.

The drawbacks to the use of nitrate of silver is its staining the hands and the linen of the dentist, the defective spots in and between the teeth, and occasionally, even with the greatest care, the lips of the patient, especially the very young and unquiet folk we have to deal with at the age of four or five. I think my large experience in this very troublesome and disagreeable remedy will enable me to give some hints which may be of benefit to the most experienced among you. Let us take a patient of six years with the first permanent molars erupted. Decayed proximal surfaces on temporary molars are ground off V-shaped, having them touching only at the gum line and leaving the mesial surfaces of the first permanent molars free, as recommended by Arthur a quarter of a century ago. Cotton or paper rolls are laid above the upper left row of teeth; cotton rolls are better to manage than paper rolls or napkins, as these often require so much manipulation that the fingers of the operator become stained. The teeth are dried off with paper or spunk and alcohol or ether. If covered with detritus they are previously cleaned with engine brush wheels. All fine sulci and defects are scraped out with fine pointed explorers. A thin burnisher or spatula

is forced between the teeth in contact, or tape or silk with pumice powder is passed between to insure the flowing of the nitrate of silver where it is most needed. When all surfaces are perfectly dry and clean a pellet of cotton no larger than a grain of wheat is dipped in 40 per cent nitrate of silver, and the surface taken off by touching it on an absorbent surface outside the mouth. The teeth are all now moistened with the medicine, applying freely down to the gums and pressing it in the sulci and crevices. When all are covered a very thin steel spatula or steel pin ground thin, which will pass freely between the teeth, is dipped in the fluid and a part of a drop is thus conveyed to the interproximal spaces and the spatula wedged in so that the flueid will flow by capillary attraction into all spaces and defects on the proximal surfaces. A fine needle explorer, No. 13 or 14, will work the fluid into the sulci where it is of the greatest importance, and if this is not done the medicine will not penetrate the accumulations in these little depressions and will be lost in its effects where it is most needed, and the lower surfaces of this fermenting mass will go on with their work of decay, although the remainder of the tooth has been bathed with nitrate. The 40 per cent nitrate may flow on the margins of the gums and between gum and root with only beneficial effect. The cauterized darkened gum margins will exfoliate, leaving a stimulated and freshened gum in its place.

After the nitrate of silver has been dried in and reapplied and worked in until it has reached every possible surface and crevice we may secure a deposit of iodid of silver—a yellow insoluble antiseptic powder—in all the crevices of teeth, which will partially fill the spaces wherever the nitrate has flowed with a substance which is much more desirable than the usual dangerous accumulations which find their way in these depressions, by bathing the teeth on all surfaces with iodin tincture. This neutralizes the color and stain of the nitrate of silver and can be readily brushed away. The nitrate, however, will penetrate further than the iodin, and thus we get the deeper effect of the nitrate coagulation while the outer superficial portions are neutralized and stains minimized. A similar neutralization may be accomplished with jod kali, producing a deposit of iodid of silver. Either of these or Eau de Javelle may be used to neutralize stains on the skin or linen, or we may use sublimate 5.0, salt 5.0, and water 200.0 to remove stains.

$AgNO_3$ should never be used on the front teeth about porcelain

fillings or leaky gold fillings. The discoloration it produces on the surface of gold fillings is quickly and permanently removed. In passing it over amalgam fillings we get other undesirable and blacking metallic compounds which should not be carried to other tooth surfaces. Nitrate of silver is invaluable about the margins of defective plastic fillings, and Frank of Vienna uses it on darkened spots opposite cavities of decay.

Harlan and Truman have widely divergent opinions as to its penetrating power, but Szabo has demonstrated conclusively that it is self-limiting in its penetrating powers and goes no deeper than from ½ to 1 mm. even if one uses from 10 per cent to pure crystals or innumerable times with the tooth perfectly dry under rubber.

The length of this paper precludes the possibility of considering the various substitutes for nitrate of silver with its objectionable color. Other medicaments may be found which will produce the same or equally desirable results, but they should have the identical action on dentin, enamel and the soft tissues, namely, have limited penetrating power in the tubuli, be cauterizing in their effects, be capable of coagulating albumen, have the peculiarly stimulating effect on dentin development which nitrate of silver has and not its color on defective surfaces of the teeth, be capable of producing in the softened dentin an impenetrable layer of coagulated albumen and destroyed dentinal fibrils through which the germs of caries (and their name is legion) cannot penetrate. All the other *silver* preparations have the same objection in color though in less degree. Lactate of silver (actol), soluble in 15 parts water, has certain valuable qualities, and itrol, soluble only in 4,000 parts water, does not seem to offer any points by which we can substitute it for nitrate of silver. Nitrate of mercury I am now experimenting with and have two chemists making various tests, but clinically it has not been satisfactory as a substitute.

There is a possibility that sublimate—bichlorid of mercury—can be soaked into the defective dentin and reduced to monochlorid of mercury (calomel), giving a white insoluble powder instead of the black silver salts or the yellowish brown iodid of silver, but it is not up to the other requirements of a successor to the old reliable nitrate of silver.

None of these four—or chlorid of gold—has been given the attention which they deserve in this great study of preventive dentistry, but it is my hope that the possibilities which I have just touched on

in this paper may be worked out by our chemists and scientists in the profession, and that they may be able to bring about a state of affairs in our profession which will at least enable the coming generations to expect something from us dentists that the present and former generations have not had—preventive dentistry.—*Review.*

CRITICAL REVIEW OF SOME CHANGES IN THE TEACHING AND PRACTICE OF DENTISTRY. By B. Holly Smith, M.D., D.D.S., Baltimore. Read before the Indiana State Dental Society, July, 1903. While it is true that the old live in the past, it is also a fact that the active have a legitimate inheritance in the lessons which it teaches. History repeats itself not because of dumb inactivity or because of any fatality in the cycle of events, but because men in all ages have learned lessons of their predecessors. The individual and well-advised act of one man is seldom the result of an impulse having its origin *de novo,* but rather of an educated and trained creature, who brings to bear upon every act, whether consciously or not, the product of that education and training. Individual attitude of mind softens, wavers and changes as a subject is unfolded and illumined by comment and criticism. God-fearing men learn to respect the opinions and views of others, and the stubbornness born of ignorance melts before the warmth and light of intelligent discussion.

There is perhaps no analogy in the history of professional organizations and advancement to the organization and development of dentistry in its teachings and practice. This rapid advance is directly traceable to correspondence and exchange of views. There is no gainsaying the fact that even in the day of the locked laboratory door individual skill existed among the practitioner of dentistry, but no one at that time could have foretold such general excellence as exists to-day.

At the time of the organization of the National Association of Dental Faculties we had in this country a number of dental colleges, each pursuing its own plan of teaching entirely independent of what might be the methods of any other school. There were no entrance requirements, and any one with five years' practice could present himself for graduation after five months' course. Many indeed were graduated without an entire five months' attendance. These men represented professional dentistry in their several sec-

tions, and what is stranger yet, many of them still represent it. Indeed, many of our best men of twenty years ago had no college training. Men since that time have acted as examiners, having themselves received no instruction in college, so that not wholly but in part dentistry was just a little while ago a cult or calling which might be adopted by any individual who had the inclination to do so, and could secure the cooperation of a preceptor and the possession of a few books; the result being that its title was looked upon as the evidence of a partial, often a very meager culture. To-day no one is allowed to present for an examination to practice dentistry who has not had a degree. In many dental societies the degree is a prerequisite to membership, as it is to membership in many examining boards. To secure this degree the applicant must pass an entrance examination equivalent to two years' high school work and spend four years of seven months each in a dental school; if successful in obtaining his diploma here, he must still have his training approved by a state examining board before he can practice. It reminds one of the husband's answer to the wife's telegram: "Mother died this morning; shall we embalm, cremate or bury?" He answered, "Do all three; take no chances." Dental students and mothers-in-law may be under the ban as annoyances, but may there not be another side to such questions?

Medicine embraces many specialties and the possession of the degree of M. D. permits the possessor to practice any or all of them. Not only has he the consent of his associates to make his own selection, but the public does not demand or look for more than his M. D. Yet dentistry, which has only recently aspired to be a specialty of medicine, demands as much time in preparation for the special degree as does medicine, and gives no entrance to the practice of any other specialty. Indeed in many states the possessors of its special degree are not allowed by law to prescribe drugs or administer anesthetics.

It would indeed be absurd in any one acquainted with the practice of dentistry to contend for slack preparation or lack of education in its followers, as it is in bad form for one who desires to be ambitious for the uplifting of his calling to belittle the amount of skill and training required for its successful practice. It is not with any such end in view that we wish to bring to your careful consid-

eration the rapid and extensive advancements in requirements for practicing dentistry to-day.

We have claimed that these advances were accomplished by legislation enacted by the National Association of Dental Faculties, but this body has always been influenced by the demands of the writers and thinkers of the profession at large, and its acts must be regarded as the active and virile expression of the profession itself.

One who has been in constant attendance on the sessions of the Association must have been impressed by the avalanche of resolutions offered for extension of course and qualifications, with the readiness of its members to respond to the recognized demands of dentistry; indeed, it has often seemed that the eagerness has assumed a form of rivalry, and when the fever was on advocacy of absurd propositions was not uncommon. Even when men were convinced that extreme measures were being taken they were only too glad to be registered as voting for them. It often appeared that we did not any of us care to seem to oppose advance. The tide of clamor for extensive advance swept over that body, leaving its members in no very judicial frame of mind. Not a little of this clamor came from those who were anxious to rehabilitate the American degree abroad, and the first thing done after declaring for four years was to cable the fact to the International Dental Federation.

Four years of seven months may not be too long, but the extension to this point may be only a station on the way to a very much more lengthy term. If we can determine soberly (not when swept off our feet by oratory or intemperate advocacy) by a fair trial that it is necessary to have such a course in order to prepare one for the practice of dentistry, or even that we are making *better* dentists, I will not object; but I do object to such a radical, almost unreasonable demand, just because it has become fashionable or that we wish to placate our friends across the water.

The American of a little while ago entered active life early; he made his impression upon the civilized world in invention, discovery and ability to do things, until now the peoples of the earth stand in awe of him as a rival and are ready to greet him as a helper. How was this accomplished? Not by any dilettante ambling through college or unnecessary loafing about the seats of learning,

but by early application of the healthy enthusiasm of youth to the task to be accomplished.

Sociologists declare that for the good of society man should marry early, yet our educators are trying to make this impossible. We are trying to build up as nearly as possible the condition of late arrival, which has held Europe in a tight grip of inactivity and lack of initiative, to substitute the old man's "What's the use?" for the young man's "Let me try." Some college men see this and are pleading for such a readjustment of our educational system as will let the worker obey the old adage, "Rise early." Indeed, the first dental school to revolt against four years' course was a department of a university whose president, always progressive, has declared for moderation in time spent in preparing for life work. When we recall that the representatives of this very department were most enthusiastic in pleading for extremes, we think we can see the hand of the man who has looked at the question from no narrow or prejudiced standpoint.

What our schools did need at the time of the introduction of the four years' course was an intelligent selection and arrangement of studies. The adoption of a graded course, and most of all the division of classes into sections, with more clinical instructors and laboratory men. This would have allowed that individual teaching which is so prominent a part of the instruction of the most successful educators of to-day. Football, baseball, glee and mandolin clubs may foster college spirit, but if it is for these that more time is given, then it is a vain effort to make better dentists by the extension. These teams and clubs have their place in that college life which should be preliminary to our special training, but the years of special training should be seriously employed and fully occupied.

More attention should be paid to preliminary preparation, a premium placed upon it, and your essayist gives notice that he will introduce in the National Association of Dental Faculties a resolution this year, giving a credit of one year to the possessors of the A. B. degree obtained in the chemical-biological course of colleges teaching such a course as that in Johns Hopkins University. Men who have pursued such a course will have studied and mastered more chemistry and physiology than is taught in any dental college in one year. By such action our schools would open a way and invite men to enter dentistry who are better equipped to study the

scientific portion of it, and of such broad culture as to fit them to represent it in the most intellectual and scientific circles. Then, too, we more nearly discharge our obligation to those who think of adopting our profession, by suggesting a trend in preliminary training that will not only best fit them to take up the special training, but incidentally possess them of a broader culture which must always make them more useful and a greater credit to our calling. Bring the student, with the proper habits of study, to the special work, and (if he is not too old) he will accomplish more than if he should spend more time without such preparation.

It is no insignificant comment upon the preliminary equipment of the dentists of to-day that the Army Examining Board saw fit to examine its applicants in physics, and found on the whole that its questions in that branch were not answered so well as upon most other subjects. The examiners must have known that physics was not a part of any dental curriculum, and the standard of admission to dental colleges before that examination did not make it obligatory on the applicant to have passed such a course.

It is necessary that men who essay to study dentistry should begin right, that is, with a fair preliminary equipment and habits of study; then as quickly as possible we should teach them the principles and practice of our calling. We do not want a stale and late arrival, for youth and enthusiasm are of value here if anywhere. With this we will dismiss the consideration of changes in the teaching of dentistry, and consider briefly the more important changes in practice.

The introduction of cohesive gold, together with the much later employment of bridgework, seems from the present retrospect to have given a stamp to American dentistry strongly leaning to the utilitarian, and in many respects quite at variance with the esthetic. Perhaps the rather too reckless employment of methods and application of materials made possible by this discovery and invention have given cast to this. While American dentistry has the credit of being more protective of tooth structure and more capable of supplying deficiencies, it has not on the whole had such regard to that higher art which imitates nature in its ideal conditions. The revulsion against this utilitarianism was most violently shown by the advocates of the "New Departure," who, while they decried the use of gold, furnished no substitute worthy to take its place. It

cannot be gainsaid, however, that the influence of this school has helped to prepare the way for the popularity of the plastics which prevails to-day, a popularity which has the appearance of permanancy and promise of growth. There is vastly more amalgam proportionately being used to-day than ever before, and oxyphosphate of zinc and gutta-percha are not unknown in any dental practice.

It is not hard to see that this state of practice exists, not alone because of the advocacy of any school of writers or practitioners, but because of some advantage of its pursuit. An analysis of the conditions influencing it may be profitable: first, too much was attempted with cohesive gold and consequent failure brought discouragement; second, the lack of harmony in color gave offense to the esthetic sense; third, the time and tax to patient and operator were no small factor in rendering the major operations unpopular.

The tendency of teachers and practitioners who do well with one material or method to become wedded to same to the exclusion of any other has been a marked feature of our past. It was not at all uncommon to find skilful, and in other things rational, men going to extremes in argument against and denunciation of methods of practice which have been accepted finally as of inestimable value. We were told by one practitioner of great experience and skill that all bridgework was an abomination, and he would not allow his patients to wear it under any circumstances, yet bridgework has been unquestionably one of the greatest boons to the human race.

The demonstration by our western scientists that non-cohesive gold would not stand the stress of mastication (machine-performed mastication) must be looked upon as an effort to make it appear that this material was not suitable for filling occlusal surfaces; yet I have used it constantly in this situation for twenty-three years, and have frequently seen fillings of this material fifty years old showing no evidence of flow and little of wear. In addition to this I have seen non-cohesive gold filling rolled into a pretty and homogenous piece of plate. Similar facts must have been known to the scientists, but they had no part in the deductions drawn from the demonstration.

Again, one practitioner denounced porcelain inlays as giving no promise of durability and being less hygienic than gold, while an-

other abandoned entirely gold filling for inlay work and predicted that in the near future filling teeth with gold would be a lost art.

Such radical advocacy seems absurd, but we must regard these advocates as specialists who brought to the development of their fads such an intensity of purpose and feeling as lessened the perceptive faculties and blinded the judgment. Unconsciously these enthusiasts have had their methods woven into the practice of dentistry to-day, and while we have differed with them individually we are heirs to their discoveries and experiences and are richer for it.

When the late Dr. McKellops made a repeated offer of fifty dollars to any one who would produce an amalgam filling of his making, we did not stop filling teeth with amalgam, but more eagerly examined his instruments and methods of filling teeth with gold.

The past of dentistry has been made up, then, of advocacy of special practice of men with one idea; an advocacy as untiring as it was often absurd. The names of hundreds, while remembered for many and divers services rendered their profession, will each be associated in our minds as a special representative of some one of the integral parts which go to make up our dental practice of to-day. These men with zeal and skill have demonstrated their methods, and we have made them a part of ours. Such men seldom ride on the back seat, but in the seat of the driver, and even though the pace may be a little reckless at times they are apt to make an arrival and get their share of applause in the procession.

Our specialists have been great in skill and resource, but all of their followers have *not,* and just here has been and always will be the possibility of harm growing out of their influence. After the promulgation of the electro-chemical theory of Palmer weak-minded men abandoned their customary line of practice and did all sorts of absurd and unhelpful things instead. Many of the followers of Flagg refused to use gold at all, and in fact removed those fillings and substituted the crazy-quilt effect of many-colored cements and gutta-perchas. The Varney-Webb-Bonwill advocates gave us "plus contour" *ad nauseam* and were never happy when not producing the brass foundry effect in the human mouth. Boedecker and Shumway's followers burnished and rubbed gold and tin with an assiduity which reminds me of the wife of a Carolina Cracker. She rubbed snuff a little before breakfast to settle her

stomach; between breakfast and dinner to help digest her food; between dinner and supper because she enjoyed it most then; after supper because the children were so annoying, and in the night because she had the toothache. The followers of Black, Wedelstadt et al. have too often regarded extension for prevention to mean the extension of filling material for the prevention of tooth structure. McKellops, Holland and others have had devotees who considered the rubber dam and the Perry separator essential to all dental operations. Farrar's, Jackson's or Angle's method of orthodontia is pursued by many to the exclusion of each other or all others.

So the teaching of one idea or method has often robbed the too receptive or too credulous of an eclectic practice which would have been more productive of successful results. With the general excellence of practice existent everywhere, however, what boots it that special practice has found ardent admirers who have followed it to absurdity? Great emphasis has been given possibly to the advantages as well as the disadvantages, and the educational influence has been helpful in both directions. May we not be like Paul, debtor both to the Greek and to the barbarian—learn a larger charity, get the good out of all special practice, and show our appreciation by borrowing the enthusiasm and skill that go with each? —*Summary.*

MANAGEMENT OF CHILDREN'S TEETH. By Garrett Newkirk, M.D., Los Angeles, Cal. Read before the Chicago Dental Society. I must at the beginning make a paradox, that in this case the less includes the greater, i. e., the management of their teeth must include the management of the children themselves, and in this I take it more than half the battle may be won. Now the basis of management in every professional line is, first of all, *confidence.* Whether the managing party be a lawyer, doctor or preacher, those to be treated or operated on must have confidence in him. They must believe, first, that he is capable of doing just what he assumes to do, and, second, that he has their interest truly at heart. In other words, he must be able, he must be honest, and he would better be likewise kind.

There is no peculiar principle involved in the management of children. They are simply folk of limited knowledge and experience, and therefore entitled to an extra amount of consideration, courtesy

and kindness. We must take them as they are, recognizing their limitations, physical and mental, and act accordingly. We have first of all to get their confidence. If we have not studied child nature, if we have forgotten what we thought and how we felt when we were children, if we do not understand, if we are prejudiced against, if we do not *love* children, we might as well quit before we begin.

Grown folk have their idiosyncrasies, affinities, attractions and repulsions, children have the same. Doctors have their different followings of adults, and they would naturally have the same of children; which means that there are temperamental, psychological reasons why no one man can manage all sorts of children equally well, and he will meet now and then an incompatible, who would not be so with some other man. I should say that if one meets a child whom it is impossible to manage without the exercise of overpowering force and severe methods, there is something wrong temperamentally between the doctor and the patient, and some one else would do better. Again, as much depends upon the nervous condition of the manager as of the managed, and failure on a particular day may be followed by success or postponement to another sitting.

Much depends on the operator's confidence in himself. If he has a fear that he will not succeed with the child, a fear which makes him hesitating and uncertain in his movements, the child will note the fact instinctively and become untractable. Those who have had experience with the control of animals, especially horses, know how important it is that action on the part of the driver shall be continuous, unhesitating and firm. In my experience with children I have not found it profitable to beat about the bush or attempt side issues to any great extent. As a rule I prefer to go right at the main question and stay with it till it is settled. I think that I can get and keep the child's confidence better by getting started without preliminaries, and by keeping "something doing," which need not be of a strenuous character, but enough to keep up interest.

Another important thing in this connection is to make the child interested in his own case, not in general merely but in detail. First of all let him have the hand mirror to hold. Give him an exhibit of his teeth, pointing out the spots of decay. Do not call them cavities, say holes. Never use a term that he is not likely to understand. Draw illustrations from things with which he is familiar. Ask him if he has seen decayed spots in potatoes or apples, and how they

are often deeper and bigger than they seem to be at first. Tell him that as the decayed part has to be cut out before cooking or eating, so the decayed part of the tooth must be cut out before filling; that the filling is to keep it from decaying any more; that medicine is put in to make it hurt less, etc. Answer his questions at any reasonable expense of time. This is only common courtesy to him as a child. He has the natural curiosity incident to his time of life. He wants to know, and as the party most interested he has a right to know, the whys and wherefores of the operations of which he is the subject so far as he is capable of knowing them. A large share of difficulty in managing children, not only in the dental office but elsewhere, would be avoided if people generally would remember that they have some sense and should be treated as reasonable beings. It occurs not infrequently that they have more of unspoiled reason and common sense than their elders who come with them. They cause less trouble, too, when free from the intermeddling, fussy third party. Usually difficulties are increased whenever the parent or other attendant mixes in.

An important matter often lost sight of is that of the first impression. Call to mind how hard it has been in your own experience to set aside an unpleasant first impression of a person or a place. In fact, it is doubtful if such an impression, even if false, can ever be quite erased or cease to have its influence. The first visit of a child to the dental office ought to be, with rare exceptions, painless. The first operation should be a simple one easily borne, and the sitting should be short. Extensive decays should not be molested except for the relief of suffering, in which case the effort, if successful, places the doctor at once in the position of a benefactor. The child who goes home from his first visit with no unpleasant associations to remember, possibly with a shiny new filling of which he is proud, is pretty sure to be a tractable patient thereafter.

Next, truthfulness. One must never deceive a child or allow others to do so in his office. Perhaps I cannot do better than to quote here a paragraph or two from an unpublished lecture on the "Rights of Children"—"There are many whose chief idea in dealing with children is apparently to find what seems to be the easiest way. They are too short-sighted to perceive that an easy way at the start may terminate later in a very hard road. Such people imagine that deceit is a time-saving and profitable exercise. When lying has

failed, as lying always will, they wonder at their lack of influence, and it probably never occurs to them to look for the cause by introspection.

"A child is entitled to the truth or nothing from his parents, teachers, and all others to whom his interests are entrusted. Deliberate deception practiced on a child appears to me as abhorrent as a crime. It is something like an assassination of his moral life. It seems strange that anyone should fail to see that any trifling advantage so obtained is transient and most dearly bought. The child deceiver seems to be utterly oblivious of consequences. What can you do with a child without his confidence, and how long will confidence last after his discovery of the deception? When will people come to learn that straight out-and-out truth is the safest diplomacy in all the world? This doctrine, recently advocated by Secretary Hay, is just as applicable to little people as it is to little nations—or great ones.

Herbert Spencer says (Work on Moral Education): "The great error made by those who discuss questions of juvenile discipline is in ascribing all the faults and difficulties to the children and none to the parents. On the average of cases the defects of the children mirror the defects of the parents."

So much for the child, now something about his teeth. The dentist should see to it if he has a family practice that the children of the household are presented for examination early in life—the third year is none too soon. Parents should be diligently instructed as to the care of their children's teeth at home. Just as with adults, frequent visits will enable the dentist to discover decay in its incipient stages when necessary operations are simple and easily performed. A persistent effort should be made to overcome the general ignorance of parents with reference to the first permanent molars. It seems to be one of the hardest things in the world to make them understand that the first permanent molar is not one of the deciduous teeth. One grows weary of the continued reiteration along this line, but there is nothing else to do.

And now a few words on the lesser proposition, management of the teeth. If one can manage the owner of the teeth this is not usually a problem of very great difficulty. First, as to extractions. It is a good rule that each deciduous tooth should be kept in place till its successor is ready to take its place, which is indicated usually by the absorption of the root or roots. It has been our general

theory that the presence of the deciduous teeth along with their incoming successors was necessary to the development of the alveolar processes if not to the maxillary bones, to make space for a complete and regular arch. We have advised, and no doubt wisely in many cases, against extraction where an arch seemed crowded, saying that the crowding would assist in making room for a regular alignment of the teeth. Yet we see instances often where the arch expands for the free accommodation of the permanent teeth despite the fact that the deciduous were lost early. Which leads me to remark that there is danger of our being too conservative of badly decayed, pulpless, deciduous molars, with festering root sockets and alveolar abscesses. It is really of more importance at times to make a mouth clean than to sustain a theory of expansion. Of course we must remember the exceptional importance of saving the deciduous cuspids, and a fight we must make at all hazards is to preserve the first permanent molars. The pictures of evil resulting from the extraction of these teeth can hardly be overdrawn.

I shall say but little about fillings or filling materials for the deciduous teeth. We are all familiar with the respective virtues of cements, gutta-percha and tin foil, but I do wish to put in a plea for our new and improved non-shrinkable amalgams. It was true enough years ago, as often stated, that the amalgams then in vogue were almost worthless for the preservation of deciduous teeth. They shrank and leaked so that decay went all around them working its own sweet will. In my practice of recent years, however, the newer amalgams have been invaluable for the salvation of deciduous molars.

Let me relate an example. Shortly after my coming to Los Angeles a physician spoke to me about his little daughter. He was quite distressed by the fact that her molars at the age of three and a half years were badly decayed upon their occlusal surfaces. They were so broken and sensitive that mastication was poorly done, and it seemed to the doctor that within a short time she would have no molars at all. When she was brought to me a few days later I saw that the description had not been overdrawn. The case for a child of that age was indeed a serious one to undertake with any hope of success, but fortunately she was possessed of unusual intelligence. I gave her the hand mirror to hold while I showed her the condition of her teeth, and told her that if they were not fixed they would get worse and worse—the black spots would get bigger, her teeth would

ache and ache, they would soon get so bad that she could not chew her food, and then she would have stomach trouble, and she would not sleep well. I placed the responsibility of decision on herself, saying, "It will hurt a little to have the teeth fixed, but you are a brave little woman and I think you can stand it. We will not do more than just one each day. Will you have it done?" Her eyes looked straight into mine and she said, " 'Ess, I'll do it." And she did.

The occlusal surfaces of some of the molars were three-fourths broken down. With sharp, thin, spoon-shaped excavators I lifted out the decay, and scraped the walls down to a moderately firm basis, then went over them with a sharp round bur, touching very lightly, keeping the surfaces dry with air but slightly warmed, then treated for a few moments with carbolic acid and oil of cloves. All this time she used the saliva ejector, the use of which had been explained to her, she kept her mouth well open, and permitted the presence of pieces of spunk on either side of the tooth, and, by the way, spunk is tolerated much better by the local nerves than cotton rolls or pads of any sort that I have ever tried. Then I let the child rest. Next, after redrying, I took a small, keen-edged inverted cone bur, and with quick, light, intermittent touches made grooves at all available points for the retention of the building material.

This was Fellowship Alloy, which I mixed with a slight excess of mercury and made pliable by brisk warm rubbing with the finger. The final pressure was made with broad-faced instruments that covered the whole face of the filling. Cotton pressure and rubbing finished the edges. Adaptation to occluding cusps was made at once before the filling hardened. Gold cylinders were then pressed gently over the amalgam to absorb excess of mercury. I am partial to gold over tin for this purpose, the difference in color showing better what is taken up, and the finish is smoother.

With a special sitting for each tooth they were all gone over and every occlusal surface faced with amalgam, and that child was so gritty and interested she would not admit that she was hurt at all. That was nearly three years ago. Several additions have been made to those fillings, but not one has been lost. Mastication has been effective and the child has not had a toothache. I may add that for the lower molars I was able to use the dam long enough for the

insertion of the filling. With what other material could such results have been obtained?

Probably half or more of fillings demanded in deciduous molars are compound-occluso-distal or occluso-mesial. Failures result in many of these cases because a matrix is not used. The most convenient form is the thin blade with a handle, which anyone can make for himself. Having all in readiness, cavity prepared and stopped for the moment with cotton or spunk, the material is mixed and placed in readiness, then quickly cotton is removed, matrix placed and held, the filling is inserted and firmly condensed with a burnisher large enough to cover nearly the whole surface. The handle end of an instrument is often most available for this purpose.

In case one fears the near proximity of amalgam to the pulp, or where the dentin is very sensitive, my favorite practice is to carbolize the cavity, varnish, fill half way with cement and follow with amalgam. This being pressed firmly to place displaces the cement except a mere lining. This applies to the compound cavities, and in simple but deep occlusal cavities one may let the cement constitute half of the filling.

To insert a good filling of any plastic material—yes, of anything except cohesive gold—there must be four walls. If a wall is absent it must be supplied by means of a matrix.

To secure the best results in the management of children one must be willing to sacrifice time and energy, and to exercise unlimited patience. The work is not as a rule pecuniarily very profitable in immediate returns, but for a young man who is building up a practice I know of no better investment than to secure the confidence of children and the good will of their parents. There is in children, as compared with their elders, what insurance men call the greater expectancy, i. e., longer life and more to do. The young man who imagines that he can slight the demands of the little folks, hoping to get them later, is like the boy mentioned by the late lamented Josh Billing. He caught a young rabbit, and after looking it over concluded that he had no use for it, so he said, "I'll let it go and catch it when it gets big." Said Josh, "He is looking for that rabbit yit."

This subject has been one of special interest to me for many years. I believe that I gave the first regular stated course of lectures on the care of children's teeth that was ever delivered in a dental college. This was in the Chicago College of Dental Surgery

from 15 to 18 years ago. Such a course should be included in every college curriculum, but usually the matter receives only incidental mention.—*Review.*

VALUE OF THE DENTAL PULP AND PRACTICAL METHODS OF PRESERVING ITS VITALITY. By J. Clarence Salvas, D.D.S., Philadelphia. Read before the Pennsylvania Association of Dental Surgeons, November 10, 1903. If the opinion entertained by many of the profession, that the function of the pulp ceases after the twenty-fifth or twenty-eighth year, is correct, the natural inference is that this organ is of little or no importance to the matured tooth. Certainly we are warranted in working along the lines indicated by this theory if we believe that the dental pulp has no further function than the building or formation of the dentin. But does its utility stop with its generative function? Does it not continue to nourish the tissue which it has been concerned in forming and in which it is encased; in short, is it not the life of the tooth? If it is, its vitality should be preserved wherever possible. Black emphasizes this in summing up the results of his experiments some years ago, when he says: "Teeth that have lost their pulps and have become discolored lose strength in a marked degree, apparently from deterioration of the organic matter." Apart from this aspect of pulpless teeth there is another phase of the question which involves to an extent the validity of the opinion formerly held, that the loss of the pulp is equivalent to the loss of the tooth. To-day, however, the loss of a pulp is considered comparatively of little importance, because its structure, function and pathology are better understood, in consequence of which it can be more successfully treated; and on the other hand, our more intimate knowledge of pathology and bacteriology in their relation to the diseases of the peridental membrane enables us to successfully combat those diseases dependent upon the death of the pulp.

Notwithstanding our ability to cope with these various abnormal conditions, the fact remains, however, that a large share of the intense suffering and discomfort we are called upon from day to day to alleviate arises from teeth in which the pulp has been destroyed. This illustrates the fact that a pulpless tooth, no matter how well it may have been treated, is always apt to give trouble. When cases of this character are presented for treatment we are invariably asked

by patients what is the cause. They had been told that when the pulp had once been removed they would forever enjoy absolute bliss so far as that particular tooth was concerned. Fortunately the dentist can always attribute the source of these ills to a contracted "cold;" indeed, what the graveyard is to the physician a "cold" is to the dentist—it covers up a multitude of his mistakes. Certainly we cannot stem the tide of miseries ushered in by this common malady. But pulps will die, and where there are dentists pulps must die; their dissolution is an important factor in keeping the wheels of our "workshop" in motion; and perhaps from this standpoint we are "indebted" to those gentlemen who are advocating pulp devitalization in teeth affiicted with phagedenic pericementitis, on the ground that its vitality is an obstruction to the cure of the disease.

Whether or not removal of the pulp is a panacea for this condition is obviously a debatable question. It is not my purpose in this paper to enter into the controversy. Neither do I intend to review in detail methods of treatment of dead or dying pulps; but rather to consider under what conditions, if any, we are warranted in adopting therapeutic or other methods for preserving their vitality in preference to devitalization. In other words, I shall consider briefly the diagnosis and prognosis of inflammation of the dental pulp, as well as the etiology of the disease which if prolonged will inevitably result in its death.

The dissolution of the pulp may be attributed to various causes, and a relative comparison of same may enable us to establish or to adopt more effective means of prevention. The statistical tabulation which I have prepared for this occasion is taken from close observation, the results of which have been carefully compiled during a period of three years. While this is far from being extensive enough to establish anything authentic, it enables us to draw more definite conclusions. "The good of counting," says Samuel Johnson, "is that it brings everything to a certainty which before floated in the mind indefinitely." To facilitate subsequent reference I have classified as follows:

Class I—Of the death of pulps, five per cent are due to tissue deterioration, the result of calcific deposits in the pulp-chamber or at the apex, which usually destroys its vascular and nerve supply; also a low state of vitality, in consequence of the impairment of the nutritive functions of the body.

Class II—Fifteen per cent are devitalized for the purpose of crowning, the insertion of large fillings, and as a cure for extreme sensitiveness at the cervical margin, especially in the superior and inferior cuspids.

Class III—Thirty per cent are attributable to mechanical irritation, due to the close proximity of a filling; the continued irritation due to thermal changes, and the overstimulation of the nerve-cells in consequence of excessive grinding in the preparation of a tooth for capping.

Class IV—Fifty per cent are due to caries, or the invasion of bacteria and the absorption of toxin bodies.

It is therefore obvious that a comparatively large percentage of pulps are sacrificed unnecessarily. If, as before suggested, it is essential to preserve the vitality of the pulp wherever possible, then more conservative methods of treating it and the tissues with which it is intimately connected should be adopted. What are the most practical methods of treating the pulp and its tissue environments so as to obviate the causes as above tabulated? To consider Class I would be irrelevant to this paper, because it involves other than local causes.

In Class II I would say that this paper is not concerned with the question of removing the pulp in teeth other than those that are a source of trouble, but you will note that in this class we have those cases which, owing to some erosion at the cervico-labial and at the cervico-palatal margin, the result of abrasion from some mechanical appliance, cause considerable annoyance. While it is only in the extreme and obstinate cases that the pulp is extirpated to alleviate the trouble, nevertheless it can be obviated entirely under proper and thorough therapy. I think the most general treatment is to prescribe an antacid mouth-wash and paint the affected parts with a weak solution of nitrate of silver; but a more efficacious treatment is to adjust the rubber dam, using a cervical clamp; swab the diseased area with absolute alcohol, and inject gradually a stream of warm air, increasing the temperature as much and as rapidly as the patient will tolerate. This is followed by several applications of a fifty per cent solution of nitrate of silver.

In Class III we find an astonishingly large percentage of the death of pulps due directly to causes that we can control to a considerable extent. That the drilling of retaining pits into the body of the dentin,

and the presence of a filling that possesses to a greater or less degree the property of thermal conductivity, can be responsible for irritation sufficient to destroy the vitality of the pulp, proves conclusively the intimate connection between that tissue and the pulp organ. It is in view of this fact that in treating caries, however superficial the decay may be, methods should be adopted that will reduce to a minimum the chances of subsequent trouble. The practice of drilling retaining pits as a means of anchorage for gold fillings is gradually giving way to modern and more effective methods of retention.

The most potent factor in overcoming the injurious influence of metallic fillings on the dentinal tubules is an intermediate layer of non-conductive material. For this purpose the oxyphosphates have been extensively employed, even though they are not perfect non-conductors; but in their use the possible injurious influence of phosphoric acid on the pulp must be considered. I am of the opinion that the best material we can use to protect the sensitive tissue of the tooth is a good cavity lining as an intermediate layer between the filling and the tooth. It has all the advantages and none of the disadvantages of oxyphosphate. A lining should be employed even when the decay is superficial, as the irritation resulting from the conductivity of the filling causes hyperemia of the pulp, which is to an extent a physiological condition, but which soon becomes pathological if the irritation continues.

My records show that ten per cent of the pulps of teeth which have been capped have died within one and a half to two years from the time that the teeth were prepared and the cap put on. The grinding of a tooth sufficiently to allow of a perfectly fitting cap, between the ages of twenty and forty, or before the horns of the pulp begin to ossify, conjoined with the irritating influence of the phosphoric acid in the cement retaining the cap, results not infrequently in its death. These fatalities can be reduced—first, by protecting the exposed dentin from the phosphoric acid with a coating of Canada balsam; second, by doing less grinding, even at the expense of securing a less accurately fitting cap, in so far as the cap may be a line or two short of reaching the gum margin; third, by coating the tooth, especially the exposed portion, with a strong solution of nitrate of silver. Of the two evils, a dead pulp or a cap leaving exposed a line or two of the tooth, the latter is preferable.

In Class IV we have the greater number of deaths of pulps due to the invasion of bacteria and the absorption of toxin bodies. It is important that the stages through which the pulp passes from the time of its infection to its death should be definitely understood, for the treatment depends on our diagnosis. Bacterial invasion of the pulp invariably produces inflammation, which if acute in character can be cured; but if the inflammation becomes chronic devitalization is always indicated. Experience and observation teach that where pain has existed periodically not longer than fourteen days the prognosis is favorable. The pulp in this condition is always susceptible to a low temperature, while, on the other hand, when it becomes less susceptible to cold the prognosis is unfavorable.

In the treatment of caries, where acute inflammation exists, it is necessary to remove only that portion of decay which can be scraped away without increasing the inflammation or exposing the pulp. As an anodyne, which is always indicated in these cases, there is probably no drug more efficacious than eugenol, which is also an excellent antiseptic. If sealed in the cavity for a few days, or until the pulp becomes quiet, the cavity can be then lined with any of the various cavity linings or by a preparation consisting of oxid of zinc one part, aristol one part, and eugenol sufficient to make a stiff paste. This becomes hard enough to withstand the impacting of a metallic filling.

The capping of pulps other than those exposed mechanically is rarely attended with any degree of success; that is to say, though a pulp may become quiet for a time dissolution almost invariably takes place. Instead of capping a pulp exposed by caries, which always leaves it in a more or less morbid condition, it can be treated with a mummifying agent and assure a longer period of comfort for the tooth. I believe, however, that it is necessary in using a drug of this character to have the pulp thoroughly inoculated with it. This is best accomplished by puncturing the pulp with a sharp probe, causing it to bleed and forcing the drug in under a gentle but firm pressure, in the same manner that pressure anesthesia is applied. I do not wish to be understood as advocating the mummification of pulps indiscriminately. My experience with this method covers a period of but two years, and has been confined to cases where either devitalization or capping of the pulp was indicated.

In conclusion I would say that wherever the importance of preserving the vitality of the pulp is recognized, such methods should

be adopted as will be in conformity with the various abnormal conditions present, and that any operation which might jeopardize its well-being should be avoided.—*Brief.*

LOWER DENTURES. By R. C. Brophy, D. D. S., Chicago. Read before the Missouri State Dental Association, at Kansas City, May, 1903. The matter of making lower dentures is one which to a considerable extent merits special consideration. There is a wide difference between conditions met with and the principles involved in constructing the upper and the lower dentures. In the former case the striking of a nice equilibrium of pressure on the field of contact, upon a basis of the hardness and softness met with, the accomplishment of adaptation which remains unbroken by reason of the force of mastication creating undue pressure of the denture against the jaw at circumscribed points, and further, the preventing of undue lifting stress of the muscles of the cheeks and lips upon the rim of the denture, serve to induce its being held rigidly in position through capillary attraction.

In lower dentures this law of attraction cannot be relied upon, though probably all of us have noted its existence in occasional cases in greater or less degree, depending also in these cases upon the perfection of the adaptation or fit of the base of the denture, and the character of the tissues underlying it. Primarily, however, in lower dentures dependence for stability of position in the mouth must be expected from other sources—suction, as it is more commonly termed, offering no dependable aid.

Of course it must be conceded that in constructing the lower denture absolute perfection of adaptation of the base to the alveolar ridge is quite as important as would be the case were capillary attraction depended upon to hold it in place. With perfect adaptation of the base to the process accomplished, next comes the exercise of strategy to evoke mechanical aid in sustaining the plate in position. Much may be done toward aiding the at best unfortunate individual who wears an artificial lower denture in gaining the retentive ability to keep it in place, and one of the most potent of these aids is to carry the posterio-lingual wings of the denture well downward, and by finishing with marked concavities the lingual surfaces of these wings tend to aid retention of the plate through the tongue's lying in these grooves or concavities. Great care also

should be observed in relieving the denture of all impingement tending to lift it from a solid seat on the ridge, the point medio-lingually particularly demanding attention.

Buccally and labially it usually is well to finish with the rims somewhat flaring, thus permitting the muscles to aid in holding the denture down by lying over them. It is hardly necessary for me to mention the importance to stability of the lower denture of the manner of occluding the lower with the upper teeth. A denture may fit the process perfectly, but the occlusion of the teeth upon it with the antagonizing teeth above may utterly preclude stability of the denture. Perfect occlusion and correct articulation of the entire posterior area, with absolute absence of contact anteriorly, are important and should not be overlooked.

The matter of aiding the stability of the lower denture by constructing it of material which, though possessing greater weight, brings into service the law of gravitation, is one which it is my disposition to lay before you with particular stress. While it is argued by some men prominent in this department of practice—notably Dr. L. P. Haskell of Chicago—that weight is of no advantage in the stability of a lower denture, I am forced to declare an opposing mind. Particularly in those cases where, through excessive absorption, the alveolar ridge has quite disappeared I am convinced that weight is an advantage, and my own experience has convinced me that in no case is it a disadvantage. I wish at this stage to show you some dentures which, as the result of a number of years' experience, I am satisfied in my own mind offer many decided advantages over every other kind of denture, except the continuous gum, and in the matter of fitting these plates, if made by the method which it will be my pleasure to demonstrate to you in my clinic, positively have no equal. I would call your attention further to the fact that upper base-plates are made by myself and other practitioners after this same general plan, with the result that perfection of adaptation to the jaw is attained in a metal base, than which there is none more compatible to the soft tissues, and which when completed presents no greater weight than does the continuous-gum denture.

The manner of constructing these base-plates differs but slightly from the method generally followed of manipulating Watts' metal; this slight difference, however, comprehending the positiveness of

perfect fitting which I claim for my method of casting this class of base-plates, and it is therefore to this difference that your attention is specially directed. It is a well-known fact that plaster of Paris is incapable of withstanding the application of extreme heat without marked change in bulk. It ought therefore to be readily understood that to undertake to cast base-plates or dentures to a plaster model, which necessarily must be subjected to heat in the process, invites failure of the plates' fitting when placed in the mouth. To be brief, I would say that to cast a base-plate that will fit the mouth it must be cast to a model which is not perceptibly changed from perfect duplication of the form of the jaw upon which the plate is to rest. Let me explain my method of accomplishing this result: An impression is taken, and here I wish to say that inasmuch as the base or denture when cast will be an exact duplication of the jaw as the impression has been taken of it, it is absolutely imperative that the impression be a perfect one, in order that a perfect-fitting plate is insured. After the impression is taken (I am now speaking of the lower base-plate) a very thin shellac varnish is applied to it (thick, gummy varnish should have no place in a laboratory for separating purposes), and after it has dried the surface should be soaped—that is, a fine brush should be wet and then passed over a bar of soap until a slight lather is produced, when the surface should be carefully gone over with the brush. Plaster should now be mixed thinly and poured into the impression, and immediately out again; this to be repeated until a film or coating of plaster not to exceed a thirty-second of an inch in thickness shall completely and evenly cover the surface of the impression. Investment compound is now mixed to a stiff putty-like consistency and immediately placed in the plaster-coated impression. It is important that this be done before the plaster forming the coating sets to dryness, for in that case the coating would be liable to flake off the model either in the process of separating or subsequently. This process of coating the impression with plaster is for the purpose of forming a veneering over the model to give it a smooth surface, the investment material being of too coarse a character to give the plate, if cast direct to it, a surface sufficiently smooth.

This gives us a model which is unchangeable under heat, except for the infinitesimal shrinkage in the thin plaster veneering, which, if worthy of consideration at all, would not be likely to be found a

disadvantage. After the model is prepared, then the ordinary procedure, generally known, of casting Watts' metal plates, is followed, except that the case should be invested in the flask with the same investment compound of which the model is made. When this is done, the fact that the compound is non-shrinkable insures the retention of the molten metal within the matrix. It will be found that full and partial dentures may be made after this mode, casting direct to the teeth, using no vulcanite, or, if desired, only a layer of pink vulcanite anteriorly.

I am opposed to the use of vulcanite for base-plates; several years ago I made my last vulcanite plate, and I shall never make another one. I may be considered a crank upon the subject, but if a crank I am an honest one. I am satisfied that vulcanite was never intended to be used for any such purpose. I believe it to be contrary to Nature's laws to expect animal tissue to thrive beneath a plate of vegetable matter, devoid of free conductivity of heat, where their contact remains unbroken so constantly as is the case in upper base-plates. The fact that 100 per cent of the vulcanite base-plates worn induce in more or less time an abnormal, diseased condition of the tissues underlying them is all the proof I need of this.

You will note that I have referred to the use of vulcanite in making *upper* base-plates. I concede that, owing to the difference in the nature of the contact, this material is much less objectionable for use in lower dentures, but I am disposed to proscribe it on general principles for all cases. You will furthermore note that I have offered no objection to vulcanite on the ground that it is a poisonous material or substance. I do not do this, because I do not think this fact is responsible for the objectionable results of its use. In the persistent use of vulcanite lies a feature of dental practice which merits the denunciation of the scientific world, is to-day criticized and denounced by the medical profession, and which in many ways aside from those I have mentioned tends most potently to degrade our profession. The use of metal in constructing base-plates of dentures, and the abandonment of vulcanite for that purpose, is demanded by the interests of humanity and by the credit of our profession as a scientific body.—*Western.*

THE SCIENTIFIC METHOD IN DENTISTRY. By Edward C. Kirk, D.D.S., Sc.D., Philadelphia. Read before the Northeastern Dental Association, at Boston, October 21, 1903. Anyone who has given at least casual attention to the literature of dentistry, or who even has kept in touch with the thought of our profession by attendance upon dental society meetings, must have observed how frequently it happens that a speaker or writer expresses his lack of confidence in the observation of a co-laborer in the professional field because, as he usually expresses it, it is "only a theory," or it is "one of those scientific things for which the practical man has no use." Indeed, this attitude toward the scientific method is not infrequently expressed as downright contempt, the critic invariably priding himself upon the fact, or at least upon his assertion, that he is a "practical man." There seems to be a widespread feeling that the scientific method in dentistry is a sort of mental jugglery by which certain men find diversion in mystifying others who have no taste for that kind of entertainment.

I do not think I have overdrawn the situation, for the belief seems to be quite general that there are two aspects to dentistry—one denominated "theory" and the other denominated "practical." It is voiced generally by state boards of dental examiners; it is the current belief of dental students. Dental college faculties are by no means blameless in this connection; it is the bane of the teacher and the greatest obstacle which he encounters in training students for the intelligent practice of dentistry. Student, teacher, and examiner are each in some degree contributing to the fundamental misconception of the impracticality of science by the use of such expressions as "He knows his theory very well, but is not up in the practical side," and the several adaptations of the same idea in forms suitable to varying conditions.

I frankly admit that my indictment sounds somewhat severe, yet I am compelled to assert my belief in its truthfulness, but in so doing I desire at the outset to explain that I am bringing this matter for your consideration in no faultfinding spirit, but rather for the purpose of critically investigating the causes of this peculiar attitude of mind in our profession toward the scientific method, to examine its etiology as it were, and if possible indicate its therapeutic treatment.

Conservatism vs. Progress.—First, then, we have to recall the fact that the history of the human race furnishes unlimited examples of

the resistance which humanity opposes toward all changes in the existing order of things. No progressive step has been taken which did not meet with opposition; if founded in truth it has survived and wrought out its career of beneficence even though ignorance, superstition, or so-called conservatism, have for the time being retarded its development.

The gradual evolution of truth, the discovery of facts, the correlation and organization of knowledge and its formulation in the exact terms of scientific record, have kept up an unceasing antagonism with that element of the social organizations which shrinks from advancement, which protests against the substitution of the new for the old, and which is content with things as they are. It is unnecessary to cite instances, as we are all familiar with the general fact, and history furnishes many classic examples where the protest of conservatism against the progress of scientific truth has been recorded in acts of bloodshed and homicidal vengeance.

The sociologist discerns in this internecine strife between the progressive and conservative elements of society a beneficent factor in the evolution of a stable body politic. The hostility with which new ideas are received has been characterized by Karl Pearson in his "Grammar of Science" as "the crucible in which the dross is separated from the genuine metal, and which saves the body social from a succession of unprofitable and possibly injurious experimental variations."

The subject, then, with which we are concerned is the nature of this progressive tendency which seems to arouse so much opposition in human society, and which manifests the same quality to a degree in the dental professional body.

The term "science" is one which has done duty in defining a number of widely divergent conceptions. It has been applied to purely speculative systems having no material basis, and it has been used to designate the art of the pugilist, but in the present connection the term is limited to its specific and recognized use, to designate knowledge founded upon ascertained facts which are universally accepted as such by all normally healthy minds. It will be seen that the essence of science is knowledge of the truth, and that the scientific method is a process having for its purpose the discovery of the truth, the unfolding of natural laws by inductive reasoning from the data obtained from methodical observation of phenomena. It differs from

empiricism as knowledge differs from experience. In the early days of purely empirical medical practice applications of salves and ointments to abraded or denuded surfaces were made because of their "healing virtues," the phrase implying that the curative power was a property inherent in the application. Scientific study has shown that the curative power is the *vis vitæ* of the tissue, and that the function of the application is mainly to afford a temporary protection against irritation—a vastly different conception which has served in its general application to largely neutralize the one time superstitious reverence for the curative power of drugs and bring about their more rational use.

The scientific method in dealing with phenomena includes first of all, methodical observation, not only of a particular aspect but of all the collateral or correlated factors, second, the orderly arrangement of the observed data, and finally, by inductive reasoning, the formulation of the cause, *i. e.*, the natural law involved therein.

It is the application of the scientific method to the material problems of life that is responsible for the immensely improved circumstances which characterize the social conditions of humanity in the present generation as compared with previous generations; scientific development and social progress are interchangeable terms, or as Professor Clifford has expressed it, "Science is progress."

An Illustration from the History of Dentistry.—What is true of human society as a whole is true of its specialized activities in any department. The progress made in dentistry is measurable by the degree to which it has utilized the scientific method. To the extent that we have followed empirical modes of practice have we failed to advance—nay, worse, we have retrograded. I venture to say that in this audience there are those who easily remember that it was at one time the accepted belief that decay of the teeth was caused by lateral pressure of their approximal surfaces. I presume my friend the "practical man" is at once prepared to say, "Well, that is one of those theories long ago exploded which goes to show the truth of my contention that theories are not practical." But let us examine the matter a little more closely, and see whether that conclusion will respond to the test of scientific validity.

The lateral pressure hypothesis was founded upon just two observations as premises: First, that teeth in close contact decayed on their approximal surfaces; second, when teeth were not in contact

they rarely if ever decayed upon their approximal surfaces. *Ergo,* the conclusion: Approximal contact (or as then expressed, "lateral pressure") causes decay. Of course we know to-day that the deduction was faulty because it failed to take into account all of the phenomena of the carious process. The lateral pressure idea was therefore not a theory at all, but a conclusion deduced from the observation of a single phenomenon; it was based upon experience and not upon knowledge and reason. In short, it was not science, but empiricism; not a theory, but a false conclusion.

Now, I have said that as we have followed empirical methods we have not only failed to advance, but have retrograded. What does the record show regarding the empiricism of the lateral pressure craze in connection with dental progress or otherwise? Assuming the conclusion to be sound, the practical men of dentistry who had seen with their own eyes teeth decay on their approximal surfaces straightway adopted as their accepted mode of practice the wholesale mutilation of teeth, destroying their form and functional usefulness by sawing them widely apart to secure "self-cleansing separation," thereby causing the ultimate loss of the teeth so operated upon by inducing degenerative processes in their retentive tissues, disorganizing the occlusion, and bringing about pathological disturbances of the pulps; and after all failing as a rule to arrest the progress of decay. Nor did the separatists confine their activities to the mutilation of approximal surfaces, for numberless sound teeth were removed, the principal molar being the usual victim, in order to relieve lateral pressure and overcrowding of the denture. As a prophylactic method the system was a signal failure.

Then came revulsion of sentiment. What empiricism had failed to accomplish the scientific method undertook to do, and did do, by investigating the phenomena of caries and correctly reasoning out the problem of its cause, so that the art of operative dentistry was ultimately placed upon a scientific foundation. The practice of filling teeth was revolutionized, so that to-day we not only know how to fill teeth successfully, but why the older practice was unsuccessful in comparison with the practice of to-day.

The practical application of the lateral pressure delusion to opertive dentistry was separation by mutilation; the practical application by the scientific method is expressed in the dictum of Black that "The marginal lines of a cavity must be laid upon areas of relative immu-

nity to the attacks of caries-producing organisms in order to prevent a recurrence of decay," or as it has been epitomized—"extension for prevention."

Compare for a moment the significance of the two conclusions, the ancient empirical error and the modern scientific truth; one a generalization based upon scarcely more than a single fact and leading to an absolutely erroneous mode of practice, the other the practical embodiment of the etiology of dental caries as it has been discovered through scientific research, and the key to its successful treatment in so far as that is possible by filling methods. The ideal of one is mutilation, of the other restoration.

But my practical friend may still contend that the method of experience and empiricism is after all valuable, for it was largely through practical test of the old lateral pressure idea that we were driven to a closer study of the problem of tooth-decay, and so developed our knowledge of the better mode of practice. The answer to that contention is found in the wasteful expenditure of time and human suffering and the mutilation of vital tissue involved in the experiment, which if it have any ultimate value at all as an experiment is of a negative character rather than of a positive character. It is quite analogous to the value which the small boy claimed for pins in a composition which he had written upon that topic, and in the course of which he made the surprising statement that "pins had saved thousands of lives." When asked by his teacher how pins had saved thousands of lives, he replied, "Why, by not swallowing them!"

The Scientific Method in Orthodontia.—The practice of dentistry furnishes another conspicuous example of the value of the scientific as compared with the empirical method. Until within a very recent period the study of malpositions of the teeth was a chaotic and bewildering mass of detail. For two centuries at least the point of view was absolutely empirical in the study of this important department. Each case was a special problem, it was said, and as the expressions of malpositions apparently varied with each case, ponderous tomes of many pages would scarcely contain the detailed descriptions of the methods and fixtures which have been successfully reported and advocated for their treatment. To those of us who came into dental practice twenty-five years ago the most discouraging problem was that presented by the department of orthodontia. The attempt to

study orthodontia from the cases and appliances described at that time was not unlike the attempt to acquire a knowledge of the Chinese written language, where every word has its individual graphic symbol. It was a mass of detail with no connecting system or order, but in due course this confusing mass of data was made the subject of investigation in a methodical way. The scientific method was applied to its solution, and the underlying principle of the aberrations from normality in the positioning of the teeth was evolved in Angle's dictum that the problems of orthodontia are problems of malocclusion, and that the essential object of orthodontic treatment is restoration of the normal occlusion. This was the first step in bringing order out of chaos and the touchstone that opened up the next generalization, namely, that malposition of the first permanent molar is the principal factor in the causation of malocclusion of the dentures.

The problems of orthodontia have not all as yet been brought within the limitation of a scientific formula by any means, but the scientific method is at work upon them, and the first and most important steps have been taken to reduce the data of orthodontia to system and logical order, and what is the practical result? The difficulties presented by an infinite variety of cases have been reduced to the problems presented for solution by a few fundamental types. The treatment of cases is undertaken with intelligent understanding of their etiology, consequently with increased assurance of permanent success. Recognizing the cause, our treatment is directed toward its removal—a method of orthodontia work not generally possible before Angle's classification. And finally, the bewildering array of regulating fixtures that stand as recorded evidence of our ignorance of the principles of orthodontia are relegated to the lumber-room of antique and useless ideas, while their place is being taken by a few typical fixtures designed with reference to the classes of irregularities in occlusion which they are intended to correct and do correct.

I could take more of your time in presenting examples in other departments of our professional work, illustrating the fact that our progress has been due to the application of the scientific method to our professional problems. I have said enough, I am sure, to make clear to you just what I mean by the scientific method, and to illustrate its value—nay, more, its absolute necessity in our work. Let us not be misled by the pseudo-science, empiricism, or ignorance

which often masquerades as science. We need to avoid all false doctrine, heresy, and schism in our research for scientific truth as well as in our theology. We must have clear notions as to what science and the scientific methods are, and not only cultivate the habit of mind which they produce, but also promote the same understanding and cultivation in the agencies which are forming the professional body of the future.

Teachers Must Be Up to Date.—The schools are our most important consideration in this connection. We must understand always that the school is its corps of teachers, and that everything else in the institution is merely accessory thereto. No man should be permitted to teach, to form the habits of mind, the ideals, of the recruits of our profession who has not in some way obtained that breadth of training which means not only knowledge of the data of science but scientific culture as well. It is not what he teaches so much as how he teaches that indicates his fitness and determines the type of practitioner he creates. In proportion as the teacher uses the scientific method does he eradicate from the minds of his students the empirical method and improve their mode of practice by putting it upon a rational basis. He substitutes intelligent skill for rule of thumb, and improves the "how" by creating an interest in the "why." Many who are in full sympathy with the principles here advocated complain with much show of justice that properly trained men capable of fulfilling the cultural specifications advocated are so few as to be inadequate to the demand. Then the schools should make them! There never has been and never will be any difficulty in supplying a demand of that character if both the dental profession and the public will create it. The great difficulty is to make it evident that the demand should be made. So long as a fair proportion of those in our own ranks are content with things as they are, so long as there are those who claim that theory is impractical, so long as there are those who practice dentistry only for what they can get out of it and who have no real love for it, just so long will they be content with the empirical method, and so long the demand for more intelligent practice, broader culture and scientific method in our educational work will not be made.

I have endeavored to show that as we have evolved the principles which underlie our art we have simplified its practice and made it rational, and proportionately successful. If, then, my contention is

borne out by the facts, an aggressive application of the scientific method to our educational system must bear a golden harvest in future professional progress to which that of the past would be as the creeping of the child to the vigorous stride of the man.—*Cosmos.*

DISINFECTION OF DENTAL INSTRUMENTS WITH FORMALDEHYD. By W. D. Miller, D.D.S., M.D., Ph.D., Sc.D., Berlin. The very numerous observations and investigations of the last ten to fifteen years in the domain of the pathology of the mouth and teeth have led to the ultimate conclusion that the same principles of cleanliness and asepsis which form the basis of modern therapeutics must be observed in dental surgery no less strictly than in general surgery.

In the matter of carrying out these principles we have also come to the unanimous conclusion that the best means of bringing about an approximately sterile condition of the hands consists in a *thorough mechanical cleansing* assisted by the application of some non-irritating antiseptic such as spirit of soap or five per cent solution of lysol, and that instruments may be absolutely sterilized by boiling for from two to fifteen minutes in a two per cent solution of soda. We have also found that instruments may be sterilized with a fair degree of certainty by immersing them, after mechanical cleansing, for thirty minutes in a five per cent solution of lysol.

There are, however, many instruments, mirrors, handpieces, etc., as well as various materials, which cannot be boiled or even bathed in an antiseptic every time they are used without being more or less injured thereby. For such objects, as well as for sterilizing in general, Rosenberg recommended formaldehyd, and he constructed an apparatus in which the objects were subjected to the vapors arising from a bath of *holzin,* a solution of formaldehyd in methyl alcohol with the addition of a certain percentage of menthol to prevent too rapid evaporation. This method of sterilizing did not enjoy much popularity, and at present is scarcely made use of at all. In place of it a new method has been recommended by Percy Simundt of Berlin which appears to me to be free from some of the disagreeable features connected with Rosenberg's apparatus.

The Simundt Plan.—The Simundt apparatus consists of a flat metallic box into the bottom or sides of which a receptacle for carrying the antiseptic is fitted, being separated from the box itself by

wire gauze. This receptacle (or receptacles) is filled with disk-shaped porous bodies impregnated with formalin. The vapors of formaldehyd given off penetrate into the box and sterilize its contents, whatever they may be.

It has been claimed for this apparatus that the sterilizing of instruments is effected in thirty seconds. This, however, is a mistake. Large burs which had just been used in boring out freshly extracted teeth were hastily brushed, rinsed in pure water, dried, and placed in the Simundt apparatus, and although they were sometimes found to be sterile in five minutes, it usually required a much longer time, and occasionally as much as three-quarters of an hour, so that in practice we could hardly consider the sterilization complete under less than an hour. Excavators, chisels, and other smooth instruments, to which infectious matter does not so readily adhere, are much more quickly sterilized than burs.

For the rapid sterilization of instruments in general the formaldehyd is decidedly inferior to boiling, and personally I do not find that it has any material advantages over the five per cent solution of lysol. For such instruments, however, as may not be boiled or even repeatedly bathed in lysol, as well as for sterilizing cotton, bibulous paper, etc., I have found a welcome help in the apparatus of Simundt. Mirrors may be left in the apparatus over night even, and will be undoubtedly sterile in the morning, the only drawback being that the metal loses its polish or may even become discolored. The handpiece may also be rendered externally sterile by leaving it for from one to two hours in the apparatus.

Wads of cotton or bibulous paper which are rolled together between the fingers will seldom be found to be sterile. I have been in the habit of preparing a large quantity of them, soaking them in a solution of thymol in alcohol, drying and keeping them in a box free from dust; we then have them not only aseptic but antiseptic. The sterilization by dry heat is unsatisfactory. I have also found that it suffices to place a formalin tablet in the box containing our cotton or paper wads to keep them constantly sterile. The tablet gradually loses its strength, and must be replaced by a fresh one every five or six days. The sterilization takes place much more rapidly (inside of an hour) when the wads are placed in the Simundt apparatus. Our silk ligatures, also, which are not generally sterile, may be made so in the manner just described.

In making root-treatments many dentists cleanse the canal by means of cotton wrapped around a thin broach—in fact, this is often the only feasible way. In wrapping the broach we use our fingers, which probably have before been in the patient's mouth, maybe several times, and carry great numbers of bacteria. No one, of course, could expect such broaches to be sterile. If we wish to operate with sterile broaches the only way is to prepare a large number beforehand and sterilize them by heat, or by impregnating them with a solution of some antiseptic in absolute alcohol (which will not rust the needle), or keep them in a box with a tablet of formalin, or finally, put them for from one to two hours in the formalin apparatus. If left in long the cotton becomes brittle and adheres to the needle.

It is claimed to be an advantage of the formaldehyd sterilization that it does not in any way injure even fine-edged instruments. This statement must be taken advisedly. Any instrument which is not perfectly dry rusts profusely; perfectly dry ones do not seem to suffer if left in for only an hour; left in for days they will rust very decidedly—so that we must conclude that a slight action takes place even on dry instruments.

Sterilization of Napkins, etc.—Another question which comes up relates to the linen (napkins, towels, etc.). A communication by Clarkson and Hayden (*Dominion Dental Journal*) runs as follows: "First we decided to try if the ordinary linen as we get it from the laundry is really aseptic. Accordingly, with a pair of scissors and a pair of pliers, both absolutely sterile, we snipped a piece out of the inner folds of a towel and lodged it with every precaution on top of some sterile glucose agar, pressing the particle gently against the surface, and replaced the sterile cotton plug in the test tube, everything having been previously sterilized except the bit of linen. Then with the same care we cut a bit of fringe off the same towel (this towel had been lying in the locker for a week or more, but had never been used). Of this we made a stab in some agar medium, pressing it with a sterile needle down to the bottom of the test tube, so that it would be away from oxygen. The two tubes were placed in the incubator and watched daily, but even at the end of the seventh day there was no sign of any growth whatever. This we are pleased to think goes to prove that we can depend upon our laundry really

being sterile, as germs of every kind had every chance to develop if they were present."

Surely we cannot be expected to look upon this result as conclusive. It is very soothing to the conscience to think that the napkins which we stuff into patients' mouths are sterile, but this is not the case under ordinary circumstances. Let us suppose that at the laundry the napkins, towels, etc., are really boiled sufficiently long to make them completely sterile. They are then rinsed in water which as a rule is not sterile; it may be far from being so. Then come the drying and ironing or mangling, which are by no means carried out aseptically. During these processes the linen accumulates few or many bacteria depending upon the conditions under which the said processes are carried out. In regard to the application of heat by the hot iron: how thorough this may be, and whether the heat be sufficient to devitalize bacteria, we do not know; that will depend upon the laundress or the state of her fire. Especially the wash from Chinese laundries might give us food for reflection in this connection if it is true as reported, that the workers sprinkle their wash with water which they squirt out of their mouth in the form of a fine spray. But if the wash came from the iron perfectly sterile, the subsequent handling and exposure to air and dust entirely destroy all foundation for any hope that our linen is bacteriologically sterile. It may be, but usually it certainly is not, as I have not only deduced theoretically but determined experimentally.

Napkins may be sterilized with certainty in the formalin sterilizer or by keeping a strong formalin tablet in the box with them. I can, however, hardly recommend this procedure, since the napkin becomes impregnated with the vapor, and in sufficient amount to have an irritating effect upon the mucous membranes of some patients.

However, in regard to the dental linen, especially the napkins, we should above all things see that they are washed by healthy and cleanly people, and that they do not get into the hands of persons suffering from syphilis, tuberculosis, or other equally dangerous infectious diseases. The laundress should be instructed as to the extra precautions to be taken. We have far less to apprehend from such bacteria as may fall upon the napkins from the air; these we are constantly taking into our mouths, anyway, with the air, food, and drink in much larger numbers than we introduce on a napkin—from which we are, however, not to draw the conclusion that the

napkin should not be kept as free from contamination by handling and by dust as is possible.

The dentist encounters great difficulty in carrying out a perfect asepsis in his instrumentarium, since he operates with so many instruments and changes his patients so often that it is no little matter to sterilize them all before every operation. Instruments sterilized the day before cannot be counted upon as absolutely sterile, on account of the dust of the operating room penetrating into the drawers of the instrument case. I have been able to overcome this difficulty in a very simple manner by placing a formalin tablet in each drawer of my instrument case and renewing it about once a week. The drawers remain constantly sterile and the quantity of formaldehyd vapor which is developed is not sufficient to in any way contaminate the air of the room.

Of course the dentist should see to it that the knobs of his instrument case, as well as those parts of his operating chair with which his hands come in contact during an operation, should be kept in a clean if not in an aseptic condition.—*Cosmos.*

HOT WATER AS AN OBTUNDENT. By S. H. Guilford, D.D.S., Ph.D., Philadelphia. The dental profession has run the gamut of pain obtundents, from sharp instruments, creasote and zinc chlorid to hot air, cataphoresis and various medicinal compounds. Of all these, dehydration of the dentin seemed to be the method that gave the best results and the one that could most generally be depended upon. The electric current alone availed little, while in cataphoresis the current was used only to carry the cocain or other drug deeper into the tooth structure. By depriving the dentin of its moisture one of the main essentials for the transmission of sensation was removed. To be informed now that an excess of moisture when raised to a high temperature will accomplish the same result reverses our previous ideas upon this subject.

Hot water has been used for years by certain practitioners to lessen or obviate the pain ordinarily attendant upon the grinding of the crowns of natural teeth previous to the mounting of crowns and bridges, but its employment for the obtunding of pain in excavating has for the first time been revealed to the writer through an appliance devised for this purpose by a Mr. Shoenberg of California.

Our attention has been called to it by Dr. Frank L. Platt of San Francisco, who says that he has had one of the appliances in constant use for several months, and is enthusiastic in his praise of it and the results it has yielded. In its original form there was a cup or receptacle which held about a half pint of water which was heated to the boiling point by a gas jet. Through this cup there passed a copper worm of small diameter which was connected with the public water supply. A small rubber tube extended from the free end of the worm to a fine metal tube, which was attachable to the engine handpiece by means of spring clips. The metal tube contained a plug or cut-off which was under the control of the forefinger, thus allowing the stream of water to flow rapidly or slowly at will. The outer opening of the metal tube was no larger in diameter than an ordinary toilet pin, thus supplying a jet that could be applied to the smallest cavity. In operation the boiling water in the main receptacle heated the water that passed through the copper worm, heating it more when it traveled slowly, and less when it passed quickly. The rapidity of the flow and, therefore, the degree of heat were regulated by the little valve in the outlet tube under finger control.

In the improved device the electric current is used to heat the copper coil direct and the appliance is so much reduced in size that it can be attached to the rim of a fountain spittoon, where the water connection is readily made with the worm. In use the water-jet is directed into the cavity and regulated by finger pressure until the highest degree of heat that the tooth will stand is obtained, after which the stream and the bur operate together, to the great comfort of the patient. When preferred the jet tube can be detached from the handpiece and directed by an assistant.

As the water accumulates in the mouth it can be carried off by a saliva ejector, or the operation can be suspended from time to time to allow the patient to discharge it into the spittoon. It can be used equally well with the rubber-dam in position by simply depressing the dam so as to form a pocket next to the tooth (in the lower jaw) and carrying off the accumulation with the saliva ejector. In the upper jaw napkins or towels can be used to receive and absorb the water flowing from the tooth. Besides its principal function, the water-jet clears the cavity of the cuttings and keeps the bur free as well.

Although devised principally for use in the preparation of cavities,

it serves an equal purpose in relieving pain while grinding down teeth for the adjustment of crowns and bridges.

One of its advantages is its simplicity and convenience, while another is the saving of time. Under former methods—whether medicaments, warm air or cataphoresis were used—considerable time had to be consumed before the tooth was in a proper condition to be operated upon. With the hot-water method excavation can be begun almost as soon as the jet is applied.

It is not claimed, I believe, that the method will entirely desensitize a cavity or tooth surface in all cases, but it does in many and in others it produces a marked diminution of sensation. This is as much as could truthfully be claimed for any previous obtundent. That the results are real and not imaginary has been proven by blindfolding a dentist-patient and noting the effect of the instrument when the water was turned on and when it was not.

If further experiment with this new method should confirm previous results it would seem that we have at hand something which we have all been anxiously awaiting, for everything tending to lessen pain in operations upon the teeth is welcomed alike by patient and operator. A facetious friend recently observed that for relieving pain, or even for reassuring a patient, he saw no reason why hot water should not be preferable to "hot air."—*Stomatologist.*

STIMULANTS CONTRAINDICATED IN HEMORRHAGE.—It is a good general rule never to give whiskey or other stimulants to a person who is bleeding, because it is apt to increase the hemorrhage and to augment the person's excitement. Keep your stimulants away until after the bleeding has stopped, and they are often unnecessary by that time.—*Intern. Jour. of Surg.*

NEW PHASE OF THE SUBSTITUTION QUESTION.—In the case of West vs. Emanuel (198 Pa. 180, 47 Atl. Rep. 965), a decision was rendered by the Supreme Court of Pennsylvania which is of interest to druggists in particular and to other vendors incidentally. The facts of the case were that plaintiff's daughter was suffering from a headache and went to the store of the defendant, a druggist, and asked for and obtained a "Kohler Headache Powder." Returning home, she took the powder and died from its effects. The court held that since she had called for a specific and defined article, and received it, there was no implied warranty of fitness for the intended use on the part of the druggist. Where the druggist is himself the manufacturer of the article, and puts in harmful drugs, their sale would be at his risk. In other words, if he had sold her something "just as good" and she had died from it, he would have had to face the consequences.

The Dental Digest.

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Where All Communications Should be Addressed.

Editorial.

THE FOURTH INTERNATIONAL DENTAL CONGRESS.

The present status of the work of organization is as follows: The work of the Congress has been divided into two sections—Department A, Science, and Department B, Applied Science, consisting of, Department A, Section I. Anatomy, Physiology, Histology, and Microscopy, of which Dr. M. H. Cryer, Philadelphia, is Chairman, and in connection with said section twenty-four members in various parts of the world have been appointed as a working committee. Section II. Etiology, Pathology, and Bacteriology, R. H. Hofheinz, Rochester, N. Y., Chairman, with a working committee of twelve members. Section III. Chemistry and Metallurgy, J. D. Hodgen, San Francisco, Chairman, with a working committee of six members. Section IV. Oral Hygiene, Prophylaxis, Materia Medica and Therapeutics, and Electro-therapeutics, A. H. Peck, Chicago, Chairman, with a working committee of nine. Department B. Section V. Oral Surgery, G. V. I. Brown, Milwaukee, Chairman, with a working committee of two thus far appointed. Section VI. Orthodontia, Edward H. Angle, St. Louis, Chairman, with a working committee of thirty-four. Section VII. Operative Dentistry, C. N. Johnson, Chicago, Chairman, with a working committee of twelve. Section VIII. Prosthesis, Charles R. Turner, Philadelphia, Chairman, with a working committee of twenty. Section IX. Education, Nomenclature, Literature, and History, Truman W. Brophy, Chicago, Chairman, with a working committee of thirty-two. Section X. Legislation. Wm. Carr, New York, Chairman, with a working committee not yet appointed.

Committees: Committee of Care of the Teeth of the Poor, Thomas Fillebrown, Boston, Chairman, with a working committee of twenty. Clinics, J. P. Gray, Chairman, Nashville, working committee not yet complete. Committee on Conference with State and

Local Societies, J. E. Libbey, Pittsburg, Chairman, with forty-four State Chairmen, each with a sub-State Committee. Committee on Educational Methods, Truman W. Brophy, Chicago, Chairman, and working committee of twenty-nine. Essays, W. F. Litch, Philadelphia, Chairman, and five members. Finance, C. S. Butler, Buffalo, Chairman, and five members. History of Dentistry, Wm. H. Trueman, Philadelphia, Chairman, and committee of four members. Exhibits, D. M. Gallie, Chicago, Chairman, and committee of eleven. Membership, J. D. Patterson, Kansas City, Mo., Chairman, and committee of six. Nomenclature, A. H. Thompson, Topeka, Kan., Chairman, committee not yet complete. Printing and Publication, W. E. Boardman, Boston, Chairman, and committee of two. Prize Essays, James Truman, Philadelphia, Chairman, and committee of two. Program, A. H. Peck, Chicago, Chairman, and committee of five. Promotion of Appointment of Dental Surgeons in the Armies and Navies of the World, Wms. Donnally, Washington, Chairman, and committee of sixty-four. Reception, B. Holly Smith, Baltimore, Chairman, and committee of twenty-eight. Local Reception and Arrangements, Wm. Conrad, St. Louis, Chairman, and committee of fifty-four. Registration, B. L. Thorpe, St. Louis, Chairman, and committee of twenty-four. Resolutions, J. Y. Crawford, Nashville, Chairman, and committee of three. The following National Committees of Publicity and Propaganda have been appointed. Austria, four members; Mexico, six; Denmark, seven; Germany, five; England, eight; Canada, nine; Sweden, three; France, nineteen; Russia, four; Holland, three; Philippine Islands, three; Norway, eleven; Japan, ten; Spain, eight.

All of which makes a total of upwards of five hundred men, exclusive of the sub-state committees, which would add about two hundred more, who are actively engaged in committee work in the United States outside of the Committee of Organization; and a total of one hundred furthering the work of the Congress in, at present, fourteen foreign countries.

The number of exhibits already promised and expected is such as to occupy all of the space at the disposal of the Exhibit Committee. A large number of essays, demonstrations and clinics are already promised and are in course of preparation from representative dentists in this and foreign countries. The financial outlook for the Congress is most hopeful, the latest report of the Treasurer show-

ing that from twelve to fifteen thousand dollars, a fair proportion of which has already been collected or is in sight, will be available for the expenses of the Congress outside of the returns from membership fees. The Committee of Organization has provided prizes for the best essay on any subject connected with dentistry, and for the best exhibit of historical character illustrating the evolution of dental science and art. Two of the most important archæological exhibits in dentistry known to the world have been secured for the Congress. Arrangements are being made for an exhibit of the technical methods in use in dental educational institutions, and the success of the scientific and practical aspects of the program are already fully assured. The Committee of Organization have devoted much time and energy to the development of their work, which is being rapidly perfected, and have met all of their expenses without cost to the Congress. They have prepared a souvenir medal, to be obtained by subscription, and have prepared and adopted designs for the official badges and insignia for the Congress, the membership certificates, etc. They have completed the details of transportation, itineraries, housing of visiting members during their stay in St. Louis, and have likewise prepared the plans for the social entertainment of visitors and members upon a generous scale.

It will be seen from the foregoing that the organization of the Congress is very complete and that the work is progressing in a most satisfactory manner. There is still much to be done, however, especially in organizing the individual states. This part of the work has been much delayed because of the controversy which arose from the fact that two committees were appointed to arrange for the Congress, one by the National Dental Association and the other by the International Dental Federation. It is not our intention to discuss at this late date the merits of the claims of these two committees; in fact, we would not refer to the matter at all, as we supposed it had been amicably settled long ago, but there appeared in the February issue of the *Dental Review* a great mass of letters and statements, many of which had appeared in some dental journals months ago, which were published at the request of a member of the committee appointed by the Dental Federation. Whether or not the other members of the Federation Committee endorse this attempt to reopen the question we do not know, and we cannot imagine what benefit can accrue to the author or to the committee, but the publica-

tion of this matter in the *Review* can have but one effect, namely, to hinder to a degree the success of the Congress, and to create additional strife, of which we have already had too much. It will not add to the success of the Congress or to the reputation of either committee, or raise the good name of American dentistry at home or abroad, for these two committees to continue accusing each other of bad faith and unworthy motives. The latest murmurings we hear are that each committee is endeavoring to secure the remaining offices—the presidency and secretaryship—and if this be true we are in great danger of being further disgraced by an open squabble over these offices. We trust, however, that this will not come to pass, but that the nominating committee, which we understand is to be appointed, and is to present names to be voted upon in open meeting, will not only bring about harmony, but will insure the success of the meetings by selecting capable men for the positions, and especially a presiding officer who possesses snap, courage and ability.

We are very glad to see that the Committee has taken a firm stand against the advertising clinician. With regard to who should be eligible to give clinics the following motion was passed: "No one shall be allowed to clinic who is interested in a financial way or in the sale of any article that he uses in his clinic." We trust the same principle will apply to papers, and we hope the committee on essays will not accept anything but original and valuable matter. They might also to good advantage limit the number of papers on any one subject. This Congress, its papers, clinics and results should prove an incentive to original and scientific work, which is greatly needed in dentistry at the present time. Heretofore each Congress has been far in advance of the previous one, and this must be no exception.

We think that the committee of fifteen appointed by the National Dental Association committed an error in judgment when they allowed themselves to be drawn into this controversy, but aside from that we have nothing but praise for their work. The labor and personal sacrifice imposed upon such a committee are far greater than anyone who has not done similar work can imagine. The synopsis of what has already been accomplished, as printed above, gives only a faint idea of the Committee's work. With these men and their numerous allies performing such yeoman service, every dentist who has the good name of his profession at heart should do everything in his power to help make the Congress a tremendous success.

We hope every man who reads this editorial will not only send his own membership fee, if he has not already done so, but will prevail upon his neighbor to do the same.

Because of the great strides which it has made during the last few years the world expects much of dentistry at the present time, and the dental world expects great things from this Congress, organized by American dentists and held on American soil. Let each man do his duty so that we may not be found wanting.

Notices.

OKLAHOMA STATE DENTAL ASSOCIATION.

The fourteenth annual meeting of the Oklahoma State Dental Association will be held at Shawnee, May 10-12, 1904.

THEO. P. BRINGHURST, Secy., Shawnee.

KANSAS STATE DENTAL ASSOCIATION.

The Kansas State Dental Association will hold its thirty-third annual meeting at Topeka, May 12-14, 1904. A cordial invitation is extended to the profession to be present. GEORGE A. ESTERLY, Secy., Lawrence.

TENNESSEE STATE DENTAL ASSOCIATION.

The Tennessee State Dental Association will hold its thirty-seventh annual meeting at Jackson, May 26-28, 1904. All ethical practitioners of the dental profession are cordially invited to attend. J. T. CREWS, Secy., Jackson.

SOUTHERN WISCONSIN DENTAL ASSOCIATION.

The tenth annual meeting of the Southern Wisconsin Dental Association will be held in Beloit, Wis., June 8-9, 1904. We anticipate a pleasant as well as a profitable meeting and a cordial invitation is extended to all.

CHAS. W. COLLVER, Secy., Clinton.

SANDUSKY COUNTY DENTAL SOCIETY.

The Sandusky County (O.) Dental Society was organized March 8, 1904, and the following officers were elected: President, Frank Creager; Vice-president, Geo. B. Smith; Secretary, Will Tiffany; Treasurer, H. N. Donaldson.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA.

The annual meeting of the Odontological Society of Western Pennsylvania was held at Pittsburg, March 8, 1904, and the following officers were

elected: President, S. M. Stauffer, Pittsburg; Vice-president, W. S. Cook, Beaver Falls; Secretary, B. M. Loar, Mount Pleasant; Treasurer, J. A. Libbey, Pittsburg; Executive Council, C. B. Bratt, Allegheny; G. W. Gage, Pittsburg.

MONTANA STATE BOARD OF DENTAL EXAMINERS.

The annual meeting of the Montana State Board of Dental Examiners will be held in Helena, June 6-8, 1904. Application blanks may be obtained from the secretary. Applicants must furnish all materials for demonstration.

D. J. WAIT, Secy., Helena.

WEDELSTAEDT DENTAL SOCIETY.

The annual meeting of the E. K. Wedelstaedt Dental Society, composed of Duluth and Superior dentists, was held Feb. 12, 1904, and the following officers were elected: President, H. V. Goetchius, Duluth; Vice-president, W. F. Gould, Superior; Secretary and Treasurer, J. G. Findlay, Superior.

FOX RIVER VALLEY DENTAL SOCIETY.

The Fox River Valley (Wis.) Dental Society was organized March 8, 1904, and the following officers were elected: President, W. H. Chilson, Appleton; Vice-president, J. W. Madden, Fond du Lac; Secretary, Mary S. Hastings, Oshkosh; Treasurer, Frank Houston, Green Bay.

TENNESSEE STATE BOARD OF DENTAL EXAMINERS.

The Tennessee State Board of Dental Examiners will meet at Jackson, May 26-28, 1904, for the examination of applicants. Applicants for examination are required to furnish their own instruments and material for operative and mechanical work.

F. A. SHOTWELL, Secy., Rogersville.

LYCOMING COUNTY DENTAL ASSOCIATION.

The Lycoming County (Pa.) Dental Association held its annual meeting last month and elected the following officers: President, J. M. Voelker; Vice-president, A. V. Robbins; Secretary B. B. Sprout; Treasurer, Stanley Jordan; Executive Committee, G. V. Welker, F. J. Richards and Wm. S. Trapp.

ILLINOIS STATE DENTAL SOCIETY.

The fortieth annual meeting of the Illinois State Dental Society will be held at Peoria, Tuesday, Wednesday and Thursday, May 10, 11 and 12, 1904. A splendid program, including attractive and unusually interesting features, is under course of preparation. The usual fare of one and one-third—certificate plan—will be obtained on all roads in the state and from St. Louis. Remember the date. All reputable practitioners are cordially invited.

HART J. GOSLEE, Secy., 580 W. Madison St., Chicago.

NORTHERN INDIANA DENTAL SOCIETY.

The sixteenth annual meeting of the Northern Indiana Dental Society will be held in Huntington, Oct. 4-5, 1904. Arrangements are being perfected to make this the greatest convention ever held in northern Indiana. Already some of the best talent in the country has been secured.

OTTO U. KING, Secy., Huntington.

KENTUCKY STATE DENTAL ASSOCIATION.

The annual meeting of the Kentucky State Dental Association will be held at Louisville, May 17-19, 1904. An excellent program has been provided and a convention of unusual interest is promised. A hearty welcome is extended to members of the profession.

W. M. RANDALL, Secy., Masonic Bldg., Louisville.

LOUISIANA STATE DENTAL SOCIETY.

The annual meeting of the Louisiana State Dental Society was held Feb. 18, 1904, and the following officers were elected: President, S. J. Harrell, Minden; First Vice-President, V. K. Irion, New Orleans; Second Vice-president, R. R. Brasswell, Ruston; Secretary, C. G. Lanaux, New Orleans; Treasurer, Chas. Mermilliod, New Orleans; Corresponding Secretary, C. A. Plough; Executive Committee, J. H. Landry, Paul De Verges, E. A. Dunbar, D. R. Shehee, Andrew G. Friedrichs, L. D. Archinard.

NEW JERSEY STATE BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY.

The New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual examination in the theoretical branches, in the assembly room of the State House at Trenton, July 5-7, 1904. Sessions begin promptly at 9 a. m. The practical prosthetic and practical operative work will be done in Newark. All applications must be in the hands of the secretary 10 days prior to the examination. For further information apply to the secretary.

DR. CHAS. A. MEEKER, 29 Fulton St., Newark.

MARYLAND STATE BOARD OF DENTAL EXAMINERS.

The Maryland State Board of Dental Examiners will meet for examination of candidates for certificates on May 4-5, 1904, at the Baltimore College of Dental Surgery at 9 a. m. Candidates must pass a written examination in Anatomy, Physiology, Pathology, Therapeutics and Materia Medica, Operative and Mechanical Dentistry, Chemistry, Bacteriology and Oral Surgery. Will also be expected to insert a gold filling in the mouth and exhibit specimens of prosthetic work properly vouched for. Application blanks properly filled in and accompanied by the fee of ten dollars must be filed with the secretary prior to day of examination.

F. F. DREW, Secy., 701 N. Howard St., Baltimore.

MONTANA STATE DENTAL ASSOCIATION.

The Montana State Dental Association was organized Feb. 23, 1904, and the following officers were elected: President, W. H. Barth; First Vice-president, John D. Sutphen; Second Vice-president, Joseph Ottinger; Treasurer, W. M. Billings; Executive Committee, George W. Polzer, R. R. Rathbone and J. B. Keenan; Board of Censors, George H. Taylor, Joseph Ottinger and G. H. Hinds; Publication Committee, F. B. Norris, A. C. Sandberg and J. D. Sutphen; Committee on Ethics, J. D. McDonald, J. T. Buckingham and J. A. Niles; Supervisor of Clinics, T. M. Hampton.

NATIONAL DENTAL ASSOCIATION, SOUTHERN BRANCH.

The sixth annual convention of the Southern Branch of the National Dental Association was held at Washington, D. C., Feb. 23-26, 1904, and the following officers were elected: President, Chas. L. Alexander, Charlotte, N. C.; First Vice-president, W. G. Mason, Tampa, Fla.; Second Vice-president, L. P. Dotterer, Charleston, S. C.; Third Vice-president, N. N. Vann, Atalla, Ala.; Corresponding Secretary, J. A. Gorman, Asheville, N. C.; Recording Secretary, J. H. Crossland, Montgomery, Ala.; Treasurer, D. B. Brabson, Knoxville, Tenn.; Executive Committee, A. R. Melendy, Knoxville, Tenn.; B. Holly Smith, Baltimore; V. E. Turner, Raleigh, N. C.; J. E. Chace, Ocala, Fla.; J. P. Gray, Nashville, Tenn.; W. H. Weaver, La Grange, Ga.

ALABAMA STATE BOARD OF DENTAL EXAMINERS.

The Board of Dental Examiners for the state of Alabama will meet in Anniston, May 9, 1904. In addition to the regular written examination the following requirements will be added, viz.: Each applicant must fill at least two teeth, approximal cavities, one with gold, the other with alloy, work to be done under the immediate supervision of the board. Board to determine or pass on suitable selections of cavities. Board will try to furnish subjects, but failing to do so, applicants for license must find or bring their own subjects, also instruments and material. Each applicant must bring a partial upper denture of not less than eight teeth ready for soldering, hard solder required, which work must also be done under the supervision of the board.

THOMAS P. WHITBY, Secy., Selma.

CALIFORNIA STATE DENTAL ASSOCIATION AND ALUMNI ASSOCIATION, DENTAL DEPARTMENT, UNIVERSITY OF CALIFORNIA.

The joint clinic of the California State Dental Association and the Alumni Association of the Dental Department of the University of California will be held May 16-19, 1904, in San Francisco. Dr. Hart J. Goslee of Chicago will give a series of clinics on porcelain. Dr. Henry A. Baker of Boston will give a series of clinics on orthodontia and the Baker anchorage, and a large local clinical program is also being arranged. All the leading manufacturers have

signified their intention of making an exhibit of their products, and the local dealers will also be represented. The session is expected to surpass any one previously held in this state.

GUY S. MILBERRY, Secy., 1202 Sutter St., San Francisco.

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

The next regular meeting of the Illinois State Board of Dental Examiners, to examine applicants for license to practice dentistry in this state, will be held in Chicago, May 6-7, 1904. Under an opinion of the attorney-general the following are eligible to take the examination before the board: "Anyone holding a medical diploma from a reputable medical college; anyone who has been a legal practitioner of dentistry for ten years prior to moving into the state, and anyone who failed to register in this state at the time the law went into effect, which was in 1881." Candidates must furnish their own patients, and come provided with the necessary instruments, rubber-dam and gold to perform practical operations and such other work as is deemed advisable by the board. Those desiring to take the examination should matriculate with the secretary at least ten days before the date of meeting. The examination fee is $10.00. Any further information can be obtained by addressing the secretary. J. G. REID, Secy., 1204 Trude Bldg., Chicago.

News Summary.

C. J. BEERS, a dentist at Seattle, Wash., died March 16, 1904.

THOMAS O'DONNELL, a dentist of Boston, died March 11, 1904.

GLENN MERRITT, a dentist of Dubuque, Ia., died Feb. 27, 1904.

H. E. DUNCAN, a dentist at Rochester, Minn., died Feb. 22, 1904.

W. L. GEMMEL, a dentist of Falls City, Neb., died March 5, 1904.

J. A. BOWDOIN, a dentist of Klamath Falls, Cal., died Feb. 14, 1904.

HENRY J. DESAXE, a dentist of New York City, died March 4, 1904.

J. F. PECK, a dentist of Tiffin, O., died of consumption Feb. 25, 1904.

F. M. SCHNEE, a dentist of Salina, Kan., died of apoplexy Feb. 19, 1904.

AUDREY W. FINCH, 66 years old, a dentist at Anna, Ill., died March 6, 1904.

JOSEPH ST. MARTIN, a young dentist of Donaldsonville, La., died Feb. 20, 1904.

WM. S. CRENSHAW, 24 years old, a dentist at Dermott, Ark., died March 6, 1904.

S. S. DOLLISON, a dentist of Pleasantville, O., died Feb. 27, 1904, after a long illness.

SAMUEL E. EMERY, 52 years old, a dentist of Newburyport, Mass., died Feb. 28, 1904.

JOSEPH C. EMMERLING, 46 years old, a dentist at Milwaukee, died suddenly March 14, 1904.

WM. O. GRAY, 42 years old, a dentist of San Francisco, committed suicide March 7, 1904.

J. HETU, 42 years old, a dentist of Brazil, Ind., died March 4, 1904, of Bright's disease.

I. P. WILSON, a prominent dentist of Burlington, Ia., died March 10, 1904, of heart failure.

MORGAN TULLES, 56 years old, a dentist of Los Angeles, died March 5, 1904, of heart failure.

MONROE J. SOLENBERGER, 38 years old, a dentist of Peoria, Ill., died Feb. 29, 1904, of pneumonia.

EVERY MAN there (Rasberry Park) was either leading a new life, or pushing it in its go-cart.—*Life.*

D. P. MCARTHUR, 89 years old, the oldest dentist in the state, died at Walden, Ga., Feb. 22, 1904.

OPENING FOR DENTIST.—According to newspaper report a Baptist dentist can do well at Purcell, I. T.

BANKRUPT.—W. H. Reber, a dentist of Chicago, has been adjudged a bankrupt in the United States court.

W. D. HOFFMEISTER, a dentist of St. Louis, died March 6, 1904, after an illness of four days of pneumonia.

DIVORCE.—Margaret E. Gould has brought suit for divorce against Frank L. Gould, a dentist of Kittanning, Pa.

J. K. WILEY, 52 years old, a prominent dentist of Springfield, Mass., died March 6, 1904, from congestion of the liver.

C. T. HART, a dentist of Osborne, Kan., was killed March 11, 1904, a wagonload of furniture overturning upon him.

HEMORRHAGE ALMOST FATAL.—February 25 a man at Las Vegas, N. M., almost bled to death after the extraction of a tooth.

A NEW ONE.—One of the large department stores of Chicago recently advertised a new tooth powder under the name of "Odontic Dentifrice."

OTIS AVERY, 96 years old, died Feb. 22, 1904, at Honesdale, Pa. He was actively engaged in the practice of dentistry up to the time of his death.

DISRESPECTFUL.—"At which joint did your friend have his arm amputated?" "That's a mighty disrespectful way to speak of a hospital."—*Baltimore American.*

SUBDIVISION OF SPECIALTIES.—Dr. B—— left today to attend the annual meeting of the Phthalinogical and Laryngolacical Association."—*Joliet (Ill.) Republican.*

FORMALDEHYD.—A dram or two of formaldehyd solution will deodorize a spittoon for days. A 10 per cent solution disinfects instruments in ten to twenty minutes.—*Dominion.*

ERASING POWDER.—Alum, sulphur, powdered pumice, potassium nitrate, equal parts. Powder, mix together, and preserve in a bottle. A little of this

powder sprinkled on a blot or over recent writing, and then rubbed with a clean piece of rag, will entirely obliterate the marks.—*Western Druggist.*

DIFFERENTIAL DIAGNOSIS.—"Faith, Mrs. O'Hara, how d' ye till thim twins aparrt?" "Aw, 'tis aisy—I sticks me finger in Dinnis' mouth an' if he bites I know it's Moike."—*Harvard Lampoon.*

[Silver stains can also be removed by saturating them with iodin, which converts the silver salt into silver iodid; the latter is then removed with an application of a saturated solution of sodium hyposulphite.—ED. *Cosmos.*]

GASOLINE CAUSES EXPLOSION.—While filling a can with gasoline, which became ignited and exploded, a dentist's assistant in Oak Park, Ill., was badly burned, as was also the dentist, and the office was somewhat damaged by fire.

FATALITIES.—Feb. 28, a woman at Lowville, N. Y., died in a dentist's chair while under the influence of ether administered by her family physician.—March 4, a woman died in a dentist's chair at Lafayette, Ind., from a stroke of apoplexy.

VIVID DESCRIPTION.—Little Margie had been to the dentist to have a tooth extracted, and this is how she explained the proceedings: "The man grabbed hold with a pair of big tongs and pulled his best, and just before it killed me the tooth came out."

ORAL SYMPTOMS OF DIABETES MELLITUS.—The so-called "dry sockets," the rapid collection of soft yellow calcareous deposits about the teeth, a specific form of pyorrhea alveolaris, and a peculiar sour-wine odor from the mouth are typical pathognomonic symptoms of diabetes mellitus.—HERMANN PRINZ, *Era.*

ROCKEFELLER RUINS TEETH.—It is stated that John D. Rockefeller is making honey by treating corn with sulphuric acid and lime. It resembles real honey in flavor and color very closely, but no matter how much it is refined it contains a certain amount of sulphuric acid, and experiments prove that it injures the teeth.

VERSATILE.—"Tom Blank, who has been up to the city learning to be a dentist, has come back to town and will operate in one of the chairs of Lawn Meeker's barber shop until he can buy himself a regular chair and rent a room upstairs. He will also help out with the shaving Saturdays."—*McCordville, (O.) News.*

HYPERSENSITIVE DENTIN.—Dr. Fayoux (*l'Odontologie*) treats sensitive dentin by filling the cavity with a paste made by mixing together zinc oxid and eugenol. A paste thus made hardens in the presence of moisture, and when allowed to remain in the sensitive cavity for eight, fifteen or more days causes the disappearance of all sensitivity.

WATER PIPES.—When waste-pipe of fountain-spittoon or sink becomes clogged, and there is no plumber available, fill spittoon or sink half full of water; then by inverting an ordinary rubber plaster bowl over orifice of waste-pipe and exerting a quick, sharp pressure on bowl the obstruction is readily removed.—DR. G. C. JORDAN, *Dom. Jour.*

MENU.—Dentist, whose office is near a big hotel: "Judging by the odor, we're going to have fish for dinner."

Patient, who has been giving his ear to a would-be soprano taking a lesson in a neighboring office building: "That so? I'm disappointed. I thought we were going to have chicken."—*Dent. Off. & Lab.*

ETHYL CHLORID.—The employment of ethyl chlorid I have found to be very effective in all cases. While I do very little extracting, nevertheless, whether it be used for the extraction of a tooth or the opening of an abscess, I find that it is not attended with the possible embarrassing results of a cocain solution.—DR. P. B. MCCULLOUGH, *International.*

A TEXT-BOOK OF THE SURGICAL PRINCIPLES AND SURGICAL DISEASES OF THE FACE, MOUTH AND JAWS. For Dental Students. By H. HORACE GRANT, A. M., M. D., Professor of Oral Surgery, Louisville College of Dentistry, Louisville. Octavo volume of 231 pages, with 68 illustrations. Philadelphia and London: W. B. Saunders & Co., 1902. Cloth, $2.50 net.

GENERAL CONDITION OF THE PATIENT.—We are too prone to "fix the teeth" with no regard to the general condition of the patient. From twenty-four to forty-eight hours' preparation is made for a slight operation at a hospital, and we should pay more attention to the general condition of the patient before undertaking painful operations.—L. L. BARBER, *Summary.*

POWER OF ADVERTISING.—A family in Florida had lost their little boy and advertised for him in a daily paper. That afternoon an alligator crawled out of the swamp and died on the front doorstep. In his stomach was found a handful of red hair, some buttons, a pair of boot heels, a glass alley, a pair of check trousers and a paper collar. The advertisement did it.—*Ex.*

PROTECT YOUR PATIENT'S EYES WHILE OPERATING.—A pair of dark eyeglasses are invaluable for this. A number of patients complain of the light being too strong. The glasses will also protect the eyes from flying particles caused by the use of pumice, disks, strips, etc. I have often seen eyeglasses covered with the above-mentioned debris.—HOMER ALMON in *Review.*

TISSUE PAPER AS SEPARATING MEDIUM.—Cut strips of tissue paper about half an inch wide, moisten and cover all the plaster, but not the wax or teeth. Pour the upper half as usual. Remove the tissue paper before packing. Applicable to any case, but especially advantageous in difficult cases. It is not necessary to wait for the plaster in the lower half to set.—J. H. NOBLE, *Cosmos.*

ANESTHESIA OF MUCOUS MEMBRANE.—Insensibility of the mucous membrane may be easily produced by the external application of a beta-eucain solution. The injection of a 1 per cent solution (to which six-tenths of 1 per cent of sodium chlorid have been added) at body temperature is absolutely painless, and effects a thorough anesthesia lasting twenty-five to thirty minutes.—*Items.*

AQUEOUS SOLUTION OF SHELLAC AS A SEPARATING MEDIUM.—Shellac will dissolve in water to which borax, potassium carbonate or any of the caustic

alkalies are added. This is readily absorbed into the plaster and leaves absolutely no film. The solution can be poured immediately on the base half without waiting for the plaster to dry, thus saving considerable time.— De Courcey Lindsley, *Western.*

To Soften Hardened Moldine.—Break into small pieces, place in an old glass, pour in considerable water, with half a teaspoonful of glycerine, and let stand in a warm place. The water dissolves the lumps and evaporates, leaving the glycerin thoroughly permeating the moldine. A little kneading or further evaporation finishes the task and makes the material as good as new. —*P. W. Smith,* Palmyra, N. Y.

The Cause of It.—It is said that Dr. Weir Mitchell, returning late from a party, awakened his sister to tell her what he thought was too good to keep till morning. A lady had been introduced to him, and, considering him a scientific man, wished to direct her conversation accordingly. "Doctor," said she, "don't you think the cause of so much sickness is the want of Sozodont in the air?"—*Philadelphia Ledger.*

To Replace a Broken Facing on Bridge.—Remove all pieces of porcelain; grind pins of selected facing down to surface of porcelain, and with copper disk wet with water and covered with carborundum powder cut a groove in the facing to admit the pins remaining in the bridge, making slight undercuts on each side of the groove. Clean the facing and pins and cement to place.—C. C. Bachman, *Dent. Off. & Lab.*

Fatalities With Nitrous Oxid With Affected Throat or Tonsils.—In deaths from gas a very considerable proportion of them have been cases in which the throat and tonsils have been affected. The congestion caused by the gas seems to increase the swelling, and death in many of the cases has been found by post-mortem examination to be due to edema of the glottis. —Ralph Hopton, *Jour. Brit. Dent. Assn.*

To Produce a Glossy Surface on Wax.—After having made the wax base plate as smooth as possible in the ordinary way, if a hard, glossy surface is desired, coat the surface with chloroform several times and with a small mouth blowpipe go over the wax carefully. The chloroform will cause the surface of the wax to melt at a lower temperature, leaving a smooth, hard surface.—C. J. Hadley, Chicago, in *Review.*

Banding a Tooth in Which There Is an Amalgam Filling.—When gold is used for banding a tooth in which there is an amalgam filling, the gold may become permeated with mercury and so weakened that eventually it may break up. A piece of platinum foil may be burnished over that part of the band which requires guarding, and soldered to it before it is bent, and thus obviate the danger.—A. Drake, *Record.*

Robberies.—F. A. Peak, Hot Springs, Ark., March 15, $75.—Haas & Culver, March 9, $75, and J. M. Keagy, March 9, $80 worth of gold and a gold watch, San Pedro, Cal.—Johnson & Lund, Rochester, N. Y., March 3, 25 pairs of forceps and a quantity of dentists' supplies.—J. J. McGaughin,

Brooklyn, N. Y., March 3, $3,000 worth of jewelry from his home.—Earl P. Hawes, Providence, R. I., March 2, $17.75.

MARRIAGES.—A. G. Able, a dentist of Easton, Pa., was married to Miss Minette Lynne of New York City, March 2.—H. C. Darrah, a dentist of Cleveland, was married to Miss Mabel Hall of Belvidere, Ill., Feb. 24.—Ben. H. Leonard, a dentist of New Orleans, was married to Miss Lillian Churchill of New Orleans, March 8.—Thomas J. Mason, a dentist of Twin Bridges, Mont., was married to Miss Effie Knowles of Sheridan, Feb. 29.

BLUE LIGHT.—Dr. Ninine of St. Petersburg has found that blue rays have the property of diminishing pain. He recently made a practical application of his discovery and obtained results markedly satisfactory. He projected a stream of blue light upon a patient and performed under its influence an operation which lasted twenty minutes. The patient was not in an unconscious state, but nevertheless did not experience any pain whatever.—*Cosmos.*

REMOVING SILVER STAINS FROM THE FINGERS.—It is stated that silver stains can be removed from the fingers by dipping them into a mixture of copper sulfate 8 parts, hydrochloric acid 2 parts, and water 90 parts, subsequently washing in a sodium hyposulfate solution, using plenty of friction, and afterward rinsing with clear water. If there are any painful cuts or abrasions of the skin it will be advisable to use the acid more dilute than stated.—*Western Druggist.*

ANTISEPTIC HEMOSTATIC.—The German pharmaceutical journals publish the description of a patent granted to R. Rhode of Breslau for a preparation containing 50 gm. of powdered alum, 10 gm. of borax, 10 gm. of glycerin, 5 gm. of zinc oxid and 10 gm. of formaldehyd solution. These ingredients are melted together and poured into suitable molds. The combination, it is said, gives an efficient hemostatic that is at the same time antiseptic and promotes healing.—*Cosmos.*

CEMENT MIXING SLAB.—I have never found anything better for mixing cement than a flat, six-ounce prescription bottle. Its value lies in its thickness, as it brings the upper surface high enough above the table to render the mixing easy. Used in hot weather cold water can be placed in the bottle, thus retarding the setting qualities of the cement, or if it is desired to increase the rapidity of the setting of the cement, warm or hot water can be placed in the bottle.—C. R. TAYLOR in *Review.*

SHORT OPERATIONS FOR CHILDREN.—Just as in school short and lively recitations please the children, so in the dental office the operation should not be continued too long, and the interest of the child should be kept up if possible throughout. As soon as he appears to tire the work should, after the tooth has been dressed with an antiseptic and temporary stopping, be deferred until another sitting. Our future to a great extent depends on how we use the children.—T. R. PATERSON, *Dominion.*

TEETH DECAYED BEYOND BIFURCATION.—Teeth decayed beyond the bifurcation will often prove useful and permanent tenants. The canals are treated

and filled. The exposed soft tissue may be properly dressed, then over it and in contact with it place a layer of tin foil or of platinum. A floor of amalgam is worked over this, to be supported by the walls and ends of the roots. The filling is finished as desired, being retained by posts from the canals or undercuts in the walls or root ends.—JOHN E. WILKINSON, *Dominion.*

MATCHING OF COLORS IN PORCELAIN WORK.—One thing that is discouraging to beginners is the fact that an inlay which matches the tooth perfectly before cementation will be found several shades off on account of the opacity of the cement. Of course it should be remembered that each inlay should be set with a cement approximating it in color. To those who are thus discouraged, let me say that within a few months there will be a blending of cement, porcelain and tooth, so that the disparity of color will disappear. —T. P. HINMAN, *Headlight.*

THE GERM.

The germ—it is a dreadful thing,
Its nature is not sunny;
It's on all we eat and drink,
And also on our money.
The doctor, though, fears not the germ—
He says that it is funny,
He bids us boil our food and drink,
And then takes all our money.—*Chicago Tribune.*

ALUMINUM LINING FOR RUBBER PLATES.—*Solvent,* one part chloroform, one part carbon disulphid, one part naphtha. *Powder,* the aluminum used by plumbers in bronzing metal work. Pack as usual, avoiding excess of rubber, and using as large pieces as possible for the palatal surface. Dip a swab of cotton into the solvent and apply to palatal surface; dust with small quantity of the powder and rub in with the moistened swab. Repeat until no more will be taken up; then with dry swab rub in more dry powder. Close the flask, bolt and vulcanize. Let it get "stone-cold" before opening. Finish with soapsuds and toothbrush.—C. W. LA SALLE, *Dent. Off. & Lab.*

COLOR OF EACH TOOTH.—As a general rule the upper centrals and laterals are nearly or quite the same color, the upper cuspids are yellower, and the remaining teeth a compromise between the two, and possibly darker. The lower teeth are nearly or about the same color, which is of rather a lighter shade than the upper cuspids. Color, we know, depends greatly on light, its direction, intensity, etc. It also depends on the translucency of the object under consideration. Two teeth may have exactly the same amount of coloring with the light from all directions, but they will differ markedly when placed in front of some dark object.—ALEX. JAMESON, *Review.*

INFLUENCE OF ALCOHOL ON SIZE OF THE HEART.—The question whether alcohol increases the size of the heart has a therapeutic bearing, since if such is the case we would not be justified in using it therapeutically in certain cases where we now employ it. Bickel has experimented as to this point on animals by subcutaneous injection or forced ingestion of alcohol in dogs, then

examining the condition of the heart. From his results with the acid of Moritz orthodiagraphic apparatus he does not prove any enlargement of the heart in animals from the use of alcohol. This result agrees with the observations of Moritz in corresponding experiments on the human being.—*Jour. A. M. A.*

Fallacy of the Term "Blind Abscess."—The dental world hears much of "blind abscesses." What is meant by this it is difficult to determine, as there is no such pathological condition existing. If by it is meant that an abscess may possibly exist somewhere without an outlet, a fistula, such an abscess may have a place in general pathology but not in dental practice. A deep-seated abscess requiring surgical attention might be so classified. An abscess means the formation of pus, and the tendency and function of pus, if it have a function, is to find an exit in the direction of least resistance. The term "blind abscess" should have no place in dental nomenclature.—*Editor International.*

Swindler Impersonates Dentist.—The latest dental swindle is reported in the *British Journal of Dental Science,* and is ingenious to say the least. The originator was in the habit of consulting the notices inserted by executors of deceased persons, asking that all accounts standing against the deceased should be presented for payment. The impostor's mode of procedure was to send in an account for dental services, using the name of some well-known dentist, but giving his own address. Strange as it may seem, for a considerable time this fraud was fairly successful, and might have been continued indefinitely but a bill was rendered for dental services to the executors of an individual who had never needed such.

Fastening Labels on Bottles.—An annoyance from which the occasional worker often suffers is to find the labels which had been carefully attached to the bottles and put away for future use, dropping off or peeling up at the corners. This is especially apt to occur if the bottles have been kept either in a very warm, dry place or in extreme dampness, and can be prevented if, after attaching the label, it is varnished with a thin solution of sodium silicate (about 30 or 40 per cent) made up with hot water. (Liquid Silex.) This varnish may also be used to attach the label, and not only serves to keep the label permanently on the bottle, but also to keep it clean and legible, as it may be wiped with a damp cloth at any time without injury.—*Popular Mechanics.*

Illegal Practitioners.—A man in Tacoma, Wash., was arrested last month for practicing dentistry under the name of a dental company and not having the names of all his employes and assistants in his front office, as required by law.—Warrants were issued for the arrest of two other individuals in that city on the same charge.—A man in Seattle, Wash., was arrested Feb. 17 for practicing dentistry without a license.—An individual at Oil City, Pa., is now in the county jail awaiting a trial on a charge of practicing dentistry without a license.—A woman proprietor of a dental parlor in New York City, in the absence of her assistants on a holiday, extracted two sound teeth from a patient. Investigation proved that she was unlicensed.—A man in Seattle,

Wash., was arrested for practicing dentistry under the general name of a company, and not having his name in a conspicuous place in his office.

FIRES.—Haas & Culver, San Pedro, Cal., March 10, total loss.—Dr. J. B. Vaughan, March 10, Chicago, loss $300.—W. J. Leary, Chicago, Feb. 26, loss $25.—F. G. Maskrey, Sabula, Ia., March 7, total loss. He was quite seriously burned.—F. M. Mitchell, March 7, Lehigh, I. T., loss $500.—C. F. and G. F. Beard, So. Framingham, Mass., Feb. 25, damage from smoke and water.—Dr. Puffenberger, Lansing, Mich., March 16.—J. E. Frenette, St. Paul, March 6, loss $2,000, fully insured.—Pennsylvania College of Dental Surgery, Philadelphia, Feb. 23, loss $5,000. Several patients under the influence of anesthetics were carried down the fire escapes by students.—Seehase & Wernecke, Manitowoc, Wis., March 10, loss $1,800, insurance $1,050.—C. D. Brayton, Lake Mills, Wis., March 13, loss $200, no insurance.

PARAFFIN AS A WOUND-PROTECTIVE.—Springer (*Centralbl. f. Chir.*) states that a thin layer of paraffin forms an ideal protective for wounds. It has a smooth surface, does not adhere to the wound or sutures, remains pliable at body temperature, does not irritate the skin, is inexpensive, and can be made thoroughly aseptic. Prepare by dropping a small piece of paraffin with a melting point of 45 to 47 degrees C. into a shallow, covered vessel containing hot water, and boiling it for ten minutes. On cooling the paraffin hardens into a thin layer on the surface of the water. At a temperature of 40 degrees C. the paraffin can be cut into suitable sizes and perforated by means of a hot needle as it floats on the water. By means of two pairs of forceps it is placed on the wound, where it readily adapts itself to the shape of the part, and is then covered with sterile gauze.—*Therapeutic Gazette.*

ASEPTIC NAPKINS.—I find that I am making more use of aseptic napkins and cotton rolls each month. I use the napkin by folding it much as I have always done the regular square linen napkin, turning one corner in about two inches and then folding it over and over until it makes a roll about a half an inch in diameter at the small end. I am also using absorbent cotton rolls more than ever. These are used under the lip in pieces about two inches long, and also between the cheek and the teeth in lengths of about one and one-half or two inches. By the aid of these absorbents I find that I can keep back the moisture long enough to do short operations. Another use that I make of the small cotton rolls is to cut them in lengths of about one-half inch, and use them for wiping the moisture from about the rubber dam after it has been applied. They are also useful in wiping about the teeth with alcohol preparatory to operating upon them. All of these preparations are to me great aids in my work, and I should be lost without them.—EDWIN T. DARBY, *Brief.*

EXAMINING BOARD AFFAIRS.—March 15 the governor of Illinois appointed C. R. Taylor of Streator to succeed Clark R. Rowley of Chicago on the state board.—March 5 the governor of Washington made the following changes in the state board: C. S. Irwin of Vancouver to succeed M. D. Thurston of Spokane, and E. B. Edgers of Seattle to succeed George W. Stryker of Ever-

ett.—January 25 nine of the eleven applicants for licenses to practice dentistry who took the semi-annual examination of the Wisconsin State Board passed satisfactorily. The State Board of Nebraska issued licenses to eleven students March 2.—March 10, the governor of Oregon appointed R. L. Lincoln of La Grande as a member of the state board to succeed J. L. Reavis of LaGrande, whose term had expired. The members of the executive committee of the state dental association are greatly exercised over this appointment, as they had selected three other dentists for the position. The governor ignored their wishes entirely in the matter, and now the dentists are searching for some way to repudiate his appointment.

DAMAGE SUITS.—A man in Chicago, who sued the city for the loss of his teeth and injuries to his legs and arms from falling over a defective plank in a sidewalk, recently recovered $4,500 damages.—A man in Philadelphia is suing the president of a dental company for $10,000 damages, claiming that after having a tooth treated by the company an abscess formed, disfiguring him for life, as the "president" said he needed no further medical treatment. —A woman of Haverhill, Mass., brought suit against a dentist there for extracting two teeth instead of one, and lacerating her tongue. The jury decided in favor of the dentist.—$2,500 is the sum asked by a man in Indianapolis for a broken jaw from a dental company in a suit for damages.—A woman in Philadelphia has brought suit against a dentist for the loss of two teeth, which he extracted without consulting her.—A man in Philadelphia is suing an extraction specialist for extracting a tooth, when the man's own dentist's card instructed him to treat a pulp. The extractor admits this, but thinks he will find no difficulty in proving to a jury that the tooth in question needed extraction.

PERPLEXED asks—Should a person with a full upper and lower be charged extra in a sleeping car?

Answer.—In *Rogers vs. C. M. & St. P. R. R.,* 36 Wisconsin, page 723, we find the following: "The Court therefore decides that inasmuch as the plaintiff, having previously as such, done so, nevertheless, in spite of this, the railroad company, or perhaps it were better to say, the party of the first part, having lawfully and after due notice being given and received, notwithstanding which the defendant may of his own free will and accord, pronounce and decree, he deeming them worthy, but in the event, as it well may be and often is, the parties hereto bequeath, assign and everlastingly let go of their lights, rights and titles in the gazabo, as previously stated, then and in that event, the state being *in loco parenthesis,* all vested rights rest *in partes tres* until such time as one or the other of the parties hereto shall be hanged by the necktie, otherwise everything is as it was and the passenger either shall or shall not as the case may be and sometimes is." We believe this to be sufficiently explicit.—GEO. E. HUNT in *Summary.*

WIRE LIGATURES.—In *Items* Dr. Ottolengui describes the use of wire ligatures: "From time to time in our literature it has been recommended to use the wire ligature instead of silk in connection with the application of the rubber

dam, but this recommendation has not met with a wide adoption. The reason probably is that no suitable wire has ever been found. Recently an attempt was made to use such a ligature, making use of the ligature wire prepared for those who adopt the Angle method for regulating teeth. The success was most gratifying and this Angle ligature wire will be found extremely useful in many difficult cases where the cavity has a margin extending beneath the gum. The ligature wire can be applied and twisted firm and then pressed so as to expose all portions of the cavity, the wire remaining in place, which, of course, the silk would not do. Another mode of using the wire suggested by Dr. J. M. Thompson of Detroit also serves a useful purpose. In this mode the wire is first doubled into a loop and the loop end twisted so as to form a tight rope-like end. The two ends of the wire are then spread apart, then around the tooth and twisted on the opposite side of the tooth to be filled. This is then cut off and we now have a twisted loop of wire on both the buccal and lingual aspects. These are so bent as to lie over against the tooth, the rubber is slipped on and the ends turned back. By this means the rubber can be held even on a short tooth where it would be difficult to use a clamp."

MEDICINE AS A PROFESSION.—In one of his recent "Fables in Slang" Mr. George Ade cleverly satirizes the chance for emolument in the medical profession as follows:

"Once there was a Young Man with a College Education, an assortment of Cravats, and about $8 in Real Money, who was anxiously looking for his Life Work. He wanted to break into a Learned Profession so that he could wear his Good Clothes all of the Time and get the Coin without working too hard for it.

"His idea of a dignified Snap was to sit in a small Office about three hours every Day and have the Public come in and pass Money to him. The Medical Game struck him as being about the softest Proposition of all. He thought that all Doc had to do was to lead the Mark into the Chamber of Horrors where they have the Skulls and the Butcher Knives, look him over, ask a few Questions, tell him to stop Smoking, and then tap him for a V.

"So the Hopeful Graduate went to the old Family Physician for a few Tips. The antique Medicine Man threw a Back Twister when he heard of the Boy's Intentions.

"'Any one who tackles the Æsculapian Stunt is a vitrified Mutt,' said His Whiskers. 'If you must earn your Living be a Porch Climber or a Short-Change Man. We now have in this Country four Medical Degrees to every case of Tonsilitis. Most of us are kept so close to the Carpet that we have to buy last year's Magazines to put in the Waiting Room. If a Patient dies all of his Friends say that you helped to push him off, so they undermine your Practice and begin to plug for Christian Science. If he gets well he gives you the Laugh, and you have to go after him with a Constable. If you acquire a Reputation they work the Night-Bell on you, and if you arrange a Dinner Party it's a Cinch that some Old Lady three miles away will ring in in an Epiliptic Fit and crab your whole Evening. Nix the Materia Medica! Turn back before it is too late.'"